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Report No: 57910 - VN

PROJECT APPRAISAL DOCUMENT  
ON A  
PROPOSED LOAN  
IN THE AMOUNT OF US\$330 MILLION  
TO THE  
SOCIALIST REPUBLIC OF VIETNAM  
FOR THE  
TRUNG SON HYDROPOWER PROJECT  
March 30, 2011

Vietnam Sustainable Development Sector Unit  
Sustainable Development Department  
East Asia and Pacific Region

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## CURRENCY EQUIVALENTS

(Exchange Rate Effective February 28, 2011)

Currency Unit = Vietnam Dong (VND)

20,877 VND = US\$1

## FISCAL YEAR

January 1 – December 31

## UNITS OF MEASURE

g	Gram	kW	Kilowatt (1,000 Watts)
GW	Gigawatt	kWh	Kilowatt hour (1,000 Watt hours)
GWh	Gigawatt hour	MVA	Megavolt Ampere (1,000 kVA)
ha	Hectare (10,000 m <sup>2</sup> )	MW	Megawatt (1,000 kilowatts)
m	Meter	MWh	Megawatt hour (1,000 kilowatt hours)
m <sup>2</sup>	Square meter	s	Second
m <sup>3</sup>	Cubic meter	TW	Terawatt (1,000 Gigawatts)
km	Kilometer (0.62 statute mile)	TWh	Terawatt hour (1,000 Gigawatt hours)
km <sup>2</sup>	Square kilometer	VA	Volt Ampere
kV	Kilovolt (1000 Volts)	W	Watt
kVA	Kilovolt Ampere (1,000 Volt Amperes)		

## IDA PROJECT ABBREVIATIONS

DSM & EE	Demand Side Management and Energy Efficiency Project (GEF TF051256)
PPM 2.2	Phu My 2.2 Guarantee (B-004-0)
PSRDPO1	First Power Sector Reform Development Policy Operation (Ln. 7868 and Cr. 4711)
REDP	Renewable Energy Development Project (Cr. 4564)
RD	Rural Distribution Project (Cr. 4444)
RE2	Second Rural Energy Project (Cr. 4000, Cr. 4576 and TF054464)
SEIER	System Efficiency Improvement, Equitization and Renewables Project (Cr. 3680, Cr. 4781 and GEF TF051229)
TD2	Second Transmission and Distribution Project (Cr. 4107)
VWRAP	Vietnam Water Resources Assistance Project (Cr. 3880)

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## ABBREVIATIONS AND ACRONYMS

AAA	Analytical and Advisory Activities	FS	Feasibility Study
ADB	Asian Development Bank	GoV	Government of Vietnam
AMT	Aligned Monitoring Tool	IBRD	International Bank for Reconstruction and Development
BOT	Build, Operate Transfer	ICB	International Competitive Bidding
CFAA	Country Financial Accountability Assessment	ICOLD	International Commission on Large Dams
CFRD	Concrete Faced Rockfill Dam	IDA	International Development Association
CHC	Commune Health Center	IDC	Interest During Construction
CLIP	Community Livelihood Improvement Plan	IFRS	International Financial Reporting Standards
CoST	Construction Industry Transparency Initiative	IGP	Independent Grievance Panel
CPC	Commune People's Committee	IMC	Independent Monitoring Consultant
CQS	Selection Based on Consultants' Qualifications	INT	Integrity Vice Presidency (of the World Bank)
CPS	Country Partnership Strategy	IPP	Independent Power Project
CSO	Civil Society Organization	JICA	Japan International Cooperation Agency
CVC	Conventional Concrete	JSC	Joint Stock Company
DA	Designated Account	LDU	Local Distribution Utility
DARD	(Provincial) Department of Agriculture and Rural Development	LV	Low Voltage
DoH	(Provincial) Department of Health	MARD	Ministry of Agriculture and Rural Development
DoNRE	(Provincial) Department of Natural Resources and Environment	MoF	Ministry of Finance
DPC	District People's Committee	MoIT	Ministry of Industry and Trade
DSCR	Debt Service Cover Ratio	MOLISA	Ministry of Labor, Invalids and Social Affairs
DSM	Demand Side Management	MoNRE	Ministry of Natural Resources and Environment
DSRP	Dam Safety Review Panel	MPI	Ministry of Planning and Investment
EA	Environmental Assessment	MTEF	Medium Term Expenditure Framework
EG	Environment Guideline	NCB	National Competitive Bidding
EIRR	Economic Internal Rate of Return	NPPMB	Northern Power Projects Management Board
EIA	Environment Impact Assessment	NPT	National Power Transmission Corporation
EMDP	Ethnic Minorities' Development Plan	OoG	Office of Government
EMP	Environment Management Plan	PC	Power Corporation
EMPF	Ethnic Minorities' Planning Framework	PER-IFA	Public Expenditure Review – Integrated Fiduciary Assessment
EPTC	Electric Power Trading Company	PFM	Public Financial Management
ERAV	Electricity Regulatory Authority of Vietnam	PoE	Environmental and Social Panel of Experts
EVN	Vietnam Electricity	POM	Project Operations Manual
FM	Financial Management	PPA	Power Purchase Agreement
FIRR	Financial Internal Rate of Return	PPC	Provincial People's Committee
FNPV	Financial Net Present Value	PHAP	Public Health Action Plan

PHMT	Public Health Management Team	SOE	State Owned Enterprise
PRSC	Poverty Reduction Support Credit	STD	Sexually Transmitted Disease
QBS	Quality Based Selection	TA	Technical Assistance
QCBS	Quality and Cost Based Selection	TB	Tuberculosis
RCC	Roller Compacted Concrete	TSHPCo	Trung Son Hydropower Company
RCM	Retail Competitive Market	TSHPP	Trung Son Hydropower Plant
RLDP	Resettlement, Livelihoods Development and Ethnic Minorities Development Program	TSHPMB	Trung Son Hydropower Project Management Board
RNFA	Return on Net Financial Assets	VCGM	Vietnam Competitive Generation Market
ROW	Right of Way	VDB	Vietnam Development Bank
RP	Resettlement Plan	VDIC	Vietnam Development Information Center
RPF	Policy Framework for Resettlement, Compensation and Rehabilitation of Project Affected People	VND	Vietnamese Dong
SBV	State Bank of Vietnam	VUSTA	Vietnam Union of Science and Technology Associations
SESIA	Supplementary Environment and Social Impact Assessment	WACC	Weighted Average Cost of Capital
SFR	Self Financing Ratio	WCM	Wholesale Competitive Market
SIL	Specific Investment Loan		



**VIETNAM**  
**VN-Trung Son Hydropower Project**

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IBRD Map VNM 37775

IBRD Map VNM37776

VIETNAM

VN-TRUNG SON HYDROPOWER PROJECT

PROJECT APPRAISAL DOCUMENT

EAST ASIA AND PACIFIC

EASVS

Date: March 30, 2011 Country Director: Victoria Kwakwa Sector Director: John A. Roome Sector Manager: Jennifer J. Sara  Project ID: P084773 Lending Instrument: Specific Investment Loan	Team Leader: Richard Spencer Sectors: Power (100%) Themes: Infrastructure services for private sector development (67%); Other rural development (33%) Environmental category: Full Assessment Joint IFC: Joint Level:		
<b>Project Financing Data</b>			
<input checked="" type="checkbox"/> Loan <input type="checkbox"/> Credit <input type="checkbox"/> Grant <input type="checkbox"/> Guarantee <input type="checkbox"/> Other:			
For Loans/Credits/Others: Total Bank financing (US\$m.): 330.00 Proposed terms: Disbursement-linked IBRD Flexible Loan with a variable spread and currency and interest rate conversion options. Loan Maturity is 22 years including a six-year grace period and level repayment.			
<b>Financing Plan (US\$m)</b>			
<b>Source</b>	<b>Local</b>	<b>Foreign</b>	<b>Total</b>
Borrower	57.08	24.64	81.72
International Bank for Reconstruction and Development	25.79	304.21	330.00
Total:	82.87	328.85	411.72
<b>Borrower:</b> Socialist Republic of Vietnam c/o State Bank of Vietnam 49 Ly Thai To Hoan Kiem District Hanoi Vietnam			
<b>Responsible Agencies:</b> Vietnam Electricity 18 Tran Nguyen Han Hoan Kiem District Hanoi			

Vietnam

National Power Transmission Company  
4 Nguyen Khac Nhu  
Tay Ho District  
Hanoi  
Vietnam

Trung Son Hydropower Company  
710B Lac Long Quan  
Tay Ho District  
Hanoi  
Vietnam

**Estimated disbursements (Bank FY/US\$m)**

FY	2012	2013	2014	2015	2016	2017			
Annual	33.59	51.16	52.11	65.60	59.67	67.87			
Cumulative	33.59	84.75	136.86	202.46	262.13	330.00			

Project implementation period: Start January 3, 2011 End: June 30, 2017

Expected effectiveness date: September 15, 2011

Expected closing date: December 31, 2017

Does the project depart from the CAS in content or other significant respects? ☐ Yes ☒ No  
**Ref. PAD I.C.**

Does the project require any exceptions from Bank policies? ☐ Yes ☒ No  
**Ref. PAD IV.G.**

Have these been approved by Bank management? ☐ Yes ☐ No

Is approval for any policy exception sought from the Board? ☐ Yes ☒ No

Does the project include any critical risks rated “substantial” or “high”? ☒ Yes ☐ No  
**Ref. PAD III.E.**

Does the project meet the Regional criteria for readiness for implementation? ☒ Yes ☐ No  
**Ref. PAD IV.G.**

Project development objective **Ref. PAD II.C., Technical Annex 3**

To supply least-cost electric power in a safe and environmentally and socially sustainable way.

Project description [one-sentence summary of each component] **Ref. PAD II.D., Technical Annex 4**

Component 1: Dam and Ancillary Construction.

Construction of main dam and appurtenant structures, supply and installation of hydraulic-mechanical and electro-mechanical equipment, access roads, bridges, borrow pits and quarries, power supply lines for construction and provision of supporting consultant services.

Component 2: Transmission Line.

Construction of the transmission line to evacuate power from the plant during the operation phase.

Component 3: Social and Environment Impact Management.  
Implementation of the Resettlement, Livelihoods and Ethnic Minorities Development Program, the Public Health Action Plan and the Environment Management Plan.

Component 4: Capacity Development and Scale-up.  
Building of EVN capacity to prepare hydropower projects to international standards.

Which safeguard policies are triggered, if any? **Ref. PAD IV.F., Technical Annex 10**

Safeguard Policies Triggered by the Project Yes No

Environmental Assessment (OP/BP 4.01)

☒ ☐

Natural Habitats (OP/BP 4.04)

☒ ☐

Pest Management (OP 4.09)

☒ ☐

Physical Cultural Resources (OP/BP 4.11)

☒ ☐

Involuntary Resettlement (OP/BP 4.12)

☒ ☐

Indigenous Peoples (OP/BP 4.10)

☒ ☐

Forests (OP/BP 4.36)

☐ ☒

Safety of Dams (OP/BP 4.37)

☒ ☐

Projects in Disputed Areas (OP/BP 7.60)\*

☐ ☒

Projects on International Waterways (OP/BP 7.50)

☒ ☐

Significant, non-standard conditions, **if any**, for:

**Ref. PAD III.F.**

Board presentation:

None.

Loan/credit effectiveness:

All standard conditions of effectiveness will apply. In addition, subsidiary loan agreements must be signed between MoF and Vietnam Electricity, MoF and Trung Son Hydropower Company (TSHPCo) and between MoF and National Power Transmission Company.

Covenants applicable to project implementation:

- (a) TSHPCo. Following commercial operation of TSHPP and as long as TSHPCo remains a single purpose company, it must maintain a debt to equity ratio of 85:15 a debt service cover ratio (DSCR) of 1.3 and a self-financing ratio of 25 percent. TSHPCo will be required to prepare a rolling five year financial plan, update it annually and to provide it to the Bank for its review. Dividend payments in any year

shall be covenanted not to exceed net earnings minus six months' of total cash expenditure requirements consisting of the sum of operations and maintenance expenses, taxes and debt service. TSHPCo will be required to maintain the PoE, PTAP and POM, and to implement the GAF. Changes to the agreed project timetable, the POM and the GAF will require the agreement of the Bank during implementation. TSHPCo will be covenanted to provide livelihood restoration support for those households which lost more than 10 percent of productive assets as a result of resettlement for the access road and to include a similar provision in the RP for any power line. In the event that TSHPCo ceases to be a single purpose company, or its assets are transferred into another company, then as part of the Bank's no objection, a further covenant will be added to the Project Agreement to require TSHPCo or the new owner to maintain a debt to equity ratio not to exceed 70:30, a debt service cover ratio of 1.5 times and a self financing ratio of a minimum of 25 percent.

- (b) NPT. In 2011 and 2012, NPT must maintain a self financing ratio of at least 20 percent and 25 percent thereafter. In 2011-2013, it must maintain a debt to equity ratio of 80:20 and 75:25 thereafter. The DSCR must be at least 1 times in 2011, 1.3 times in 2012 and 1.5 times thereafter. NPT will be required to prepare an RP for the transmission line in which provision is made for livelihood restoration support for those households which lost more than 10 percent.
- (c) EVN. EVN or its successor as Single Buyer and TSHPCo to enter a power purchase agreement at least one year before operation of TSHPP. Transfer of TSHPCo to another owner in whole or in part, or change of legal status of TSHPCo will be subject to the Bank's agreement. EVN will be covenanted to pay its share of project costs into TSHPCo as equity according to an agreed schedule. EVN will be required to maintain a Task Force consisting of staff from key departments and the Director of TSHPCo for the project duration. In carrying out studies under the Capacity Building and Scale-up Component, EVN will be bound by the requirements of the Bank's safeguards policies.
- (d) Institutional arrangements including maintaining adequate organizational and staffing structure at TSHPCo, and establishing a Task Force at EVN, and maintaining the NPPMB at NPT.

## **I. STRATEGIC CONTEXT AND RATIONALE**

### **A. Country and sector issues**

1. The economic growth of over 7 percent over the past several years is at the root of many of the issues in Vietnam's energy sector: growing GDP feeds increasing demand, while meeting that demand enables GDP to continue to grow. But there remains much to do to ensure better electricity supply for all consumers, both to improve living standards directly and to support development of local industrial, agricultural and commercial activities for economic growth and employment. As Vietnam industrializes and urbanizes, the task is shifting from connecting as many consumers as possible to one that focuses on ensuring good quality supply that can be relied on 24 hours a day, year round.

2. Between 1995 and 2010, household access increased from 50 percent to over 95 percent; and annual per capita consumption increased from 156 kilowatt hours (kWh) to about 983 kWh. The financial crisis caused a brief dip in demand growth to about 10 percent per year in 2008, but in 2009 it bounced back to nearly 14 percent and 2010 saw it close to 15 percent. Forecasts of demand growth vary, but conservative predictions are 10-11 percent in 2011 and 12 percent in 2012, declining to 8% by 2019 if energy intensity of the Vietnamese economy falls as expected. Such a forecast would result in generation needs of about 25 Gigawatts (GW) by 2015 and 39 GW by 2020 compared with 19.7 GW at the end of 2010. While the rate of that expansion can be tempered somewhat—perhaps by a few percentage points—by further reducing losses in the supply system, promoting greater efficiency in electricity use and improving power load management, the need for a major power system expansion is certain.

3. Vietnam's options for power generation include a hydropower potential of 20.56 GW, sizable resources of coal and gas, renewable energy potential of possibly over 13 GW as well as some nuclear power. Of the 16.8 GW generating capacity available at the end of 2009, around 39 percent was hydro, 43 percent oil and gas and 14 percent coal. The composition of generating capacity is beginning to change; as demand begins to exceed the available hydropower and gas resources, coal can be expected to take an increasing share.

4. From an emissions standpoint, every source that displaces coal from the generation mix would reduce emissions of both local pollutants including sulfur dioxide, oxides of nitrogen and particulates and global pollutants, especially carbon dioxide (CO<sub>2</sub>). Given current plans, greenhouse gas emissions from power generation are projected to rise from an estimated 30 million tonnes of CO<sub>2</sub> per year (MtCO<sub>2</sub>e/year) in 2009 (nearly evenly divided between coal-fired and gas-fired generation) to a little over 200 MtCO<sub>2</sub>e/year in 2025. This implies that emissions from power generation will represent some 40 percent of Vietnam's total estimated emissions of 508 MtCO<sub>2</sub>e/year in 2025 under a business-as-usual scenario.

5. Development of hydropower could have a decisive impact on Vietnam's future emissions path, since it will avoid building new coal fired plant. Hydropower represents one of the lowest cost sources of new power supply and Vietnam is constructing the Son La (2,400MW) and developing the Lai Chau (1,200MW) large plants on the Da River, adding to the current facility at Hoa Binh (1,920MW). Besides these large projects, the main focus is on medium-sized projects (typically 100-600 MW each) distributed throughout the country. About 22 such projects are under construction or are planned to enter construction over the next decade, providing a total of about 4,800 MW.

6. The challenge for hydropower is in implementation—how to maintain quality project development under the pressure to meet ever-climbing load growth. With demands to accelerate project implementation, the question is how to achieve the best results, especially in delivering new sources of electricity efficiently, at least cost, with minimum environmental and social impact and to ensure subsequent safe operation of the plant. Vietnam has made great progress in developing a modern framework for project selection, design and management but delays and cost overruns are frequent, though by no means confined to either hydro projects or the power sector as a whole. In reservoir resettlement work, policy and financial commitment is high, but there is too much focus on resettlement site infrastructure and too little on livelihood restoration. Environmental assessment work has improved, but often still lacks definition and enforcement of mitigation measures. Dam safety relies on rules-based systems that do not pay adequate attention to the risks to life and property in the event of unexpected flood events.

7. A two-prong program for assisting Vietnam in its hydropower development was agreed between the Government of Vietnam and the Bank in the latter part of 2005, following an extensive review of generation options. The first prong is a multi-year program of advisory and capacity building assistance, focusing primarily on resettlement and environmental management. The second prong is investment lending assistance, including the proposed project.

## **B. Rationale for Bank involvement**

8. Since the late 1990s, the Bank has had a wide-ranging engagement in Vietnam's power sector, making a significant contribution through policy dialogue, analytical and advisory activities, and investment lending. It has covered sector reform and restructuring, development of an efficient supply side, private sector participation, rural electrification and demand side management. Through this program, government, Vietnam Electricity (EVN) and the Bank have built a high level of mutual trust, creating a strong partnership for development of the power sector. The proposed project will be a significant contribution to this overall Bank program, focusing particularly on the sustainable development of the generation subsector in Vietnam.

9. The goal is both to support Vietnam's development of cost-effective hydropower generation and to improve implementation results in social and environmental aspects of this development. The investment project would provide urgently needed financial support and advice through a hands-on vehicle for application of new approaches and joint development of practical solutions to field implementation problems. The government requested Bank support to demonstrate good international practice to which EVN has been receptive. Through this operation the Bank would be leveraging the activities of other development agencies which are also supporting the development of hydropower.

10. The Bank's experience in Vietnam includes renewable energy, power generation and rural development projects carried out in parts of the country facing similar challenges as those of the project area. This local knowledge is matched by extensive experience of best international practice in hydropower development. In combination they have informed the dialogue on environment and social issues, permitted substantive technical assistance and supported the development of a high quality investment.

## **C. Higher level objectives to which the project contributes**

11. The proposed project will contribute to improving Vietnam's electric power service provision, reducing its costs and thus helping competitiveness. Development of an electric power



system responsive to a country's economic and social needs is critical, especially in a fast-growing economy such as Vietnam's. Both the GOV's SEDP and the Bank's Country Partnership Strategy (CPS) 2007–2011, recognize this. The CPS features energy in each of the three “vertical” pillars of the CPS, while many of the approaches respond to the principles expressed in the “horizontal” governance pillar. The energy sector's contribution is articulated as follows:

- (a) In pillar one, improving the business environment, through better meeting demand for reliable, cost efficient energy; the key indicator is meeting the continued growth in demand for power in terms of quantity, quality and commercial effectiveness;
- (b) In pillar two, strengthening inclusion, through expansion of rural access to reliable and affordable energy, for which the key indicator in the Vietnam Development Goals (analogous to the MDGs) is for 100 percent of poor communes to receive basic infrastructure by 2010;
- (c) In pillar three, strengthening natural resources and environmental management by improvement of system efficiencies and promoting the use of renewable and clean energy sources;
- (d) The support for sector reform responds to pillar four by improving power sector governance and transparency.

12. The World Bank's support for the power sector is based on a dynamic mix of analytical and advisory activities, IBRD/IDA lending for policy and investment, guarantees and facilitating involvement of other parts of the World Bank Group as needed. This multi-track approach within a well-defined but flexibly-structured program has proved effective in achieving major impacts in generation, transmission and distribution, private sector participation in generation, rural electrification, renewable energy and demand side management. The proposed project will strengthen Vietnam's ability to meet its investment needs in power generation, complementing the policy actions supported by the Power Sector Development Policy Operation series which assists the development of a competitive generation market, for which adequate generation capacity is critical.

13. A more detailed description of the power sector is at Annex 1 and a list of related projects is at Annex 2.

## **II. PROJECT DESCRIPTION**

### **A. Lending instrument, financing arrangements and other approaches**

14. The proposed lending instrument is a Specific Investment Loan (SIL). The proposed terms are disbursement-linked IBRD Flexible Loan with a variable spread and currency and interest rate conversion options. Loan Maturity is 22 years including a six-year grace period and level repayment.

15. The loan instrument has been chosen because the bulk of the financing is for a single large infrastructure asset. The loan terms match the construction profile of the dam, while providing flexibility to match the spend profile related to construction.

16. The borrower of record will be the Government of Vietnam, represented by the State Bank of Vietnam. Funds will be onlent by Ministry of Finance to: Trung Son Hydropower

Company (TSHPCo), a single purpose project company which is a wholly owned subsidiary of EVN; National Power Transmission Corporation (NPT), also a wholly owned subsidiary of EVN.

## **B. Project development objective and key indicators**

17. The objective of the project is to supply least-cost electric power in a safe and environmentally and socially sustainable way.

18. Trung Son Hydropower Plant (TSHPP) is a multipurpose project, providing power generation, flood control and irrigation benefits. At completion, the project is expected to produce an average of 1,019 GWh of electricity a year, help control annual flooding in the river valley downstream, and supplement water supplies for agricultural use during the dry season. The project will address the main sector issue of supplying least cost power to Vietnam's electricity system. It will support improved social, environment and dam safety practices in the hydropower sector by ensuring that the social and environment impacts and safety of the TSHPP follow good international practice. It will foster their further adoption by building the capacity of EVN to prepare hydropower projects to international standards.

19. Key development indicators are:

- (a) The amount of electrical energy and capacity provided by the TSHPP;
- (b) The economic and financial cost of electricity from TSHPP;
- (c) Livelihoods of those affected by project are at least maintained at pre-project levels;
- (d) Evidence of satisfactory compliance with the Environment Management Plan (EMP).

20. The results framework, project development objective (PDO), intermediate results and their indicators are set out in Annex 3.

## **C. Project components**

21. TSHPP will be constructed on the Ma River, near Co Me village in the territory of Trung Son commune, Quan Hoa district, Thanh Hoa province. The plant will have an installed capacity of 260 MW and a dam 84.5 meters high and 513 meters long at the crest that will create a 38.5 km long reservoir with an area of 13.13 square kilometers (km<sup>2</sup>). Ancillary works will include improvements to an unmetalled road to allow access to the dam site, and construction of power lines to supply and evacuate power from the dam.

22. The project area is defined by the areas affected by environmental or social impact in the Trung Son hydropower project, primarily by the reservoir but also including downstream of the dam, by the access road and the transmission line corridor. It is located between three provincial level nature reserves characterized by tropical and sub-tropical evergreen forests still with high biodiversity values: 936 species of vascular plants; 79 species of mammals; 258 species of birds and 30 species of amphibians. The area is remote with extremely poor communities composed largely of ethnic minorities,<sup>1</sup> sparse populations, and where infrastructure and services are underdeveloped and income sources other than agriculture and forestry are limited.

23. The project will include resettlement, compensation and restoration of the livelihoods of approximately 10,600 people who will be directly or indirectly impacted by the construction of

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<sup>1</sup> In Vietnam ethnic minorities is the preferred term for Indigenous Peoples.

the dam and the ancillary works. It will also include mitigation of the environmental consequences of construction and operation of the dam. Technical assistance to scale up the project by identifying and supporting preparation of one or more additional projects will also be included.

24. Total project cost is estimated at \$411.72 million, for which an IBRD loan of \$330 million is sought. The project will consist of four components as follow.

25. *The Dam and Ancillary Construction Component (total cost \$265.23 million, of which IBRD \$238.92 million).* This component is the one under which the main physical asset of the hydropower plant is created and provides the basis on which least cost electric power is generated. It will consist of four subcomponents as follow:

- (a) *Subcomponent 1a: Dam and Appurtenant Structures (cost \$205.36 million, of which IBRD \$204.83 million)* will support construction work and supply of goods for the main roller compacted concrete (RCC) dam, the power generation facilities (forebay, intake, penstocks, turbine and control buildings, discharge canal and electrical switchyard) and emergency fuse-gate and spillway. Supply and installation of hydraulic-mechanical and electro-mechanical equipment and construction of site infrastructure including quarries, workers camp, offices, water and sanitation facilities and roads within the site will also be carried out under this sub-component. Environment management and mitigation, to the extent that the contractors working on this subcomponent are responsible for it, will also be covered.
- (b) *Subcomponent 1b: Access Road and Bridges (cost \$24.91 million, of which IBRD \$24.91 million)* will consist of the upgrading of the 20.4 km road from Co Luong village to the project site at Co Me village. Two major bridges, 132 meters (m) long at Co Luong and 264 m long at Co Me and five minor bridges will also be constructed.
- (c) *Subcomponent 1c: Construction of Power Supply Lines (cost \$2.43 million, of which IBRD zero)* will finance the extension of the existing 35 kilovolt (kV) line from its termination at Co Me village to the construction site, and upgrading of the supply as demand grows.
- (d) *Subcomponent 1d: Project Management (cost \$32.53 million, of which IBRD \$9.18 million)* will consist of the consulting services to support implementation of the component including design consultants, engineers for supervision and construction management, quality assurance, monitoring, including independent environment and social monitoring, the dam safety review panel, and individual consultants to build capacity in TSHPCo.

26. *The Transmission Line Component (cost \$18.44 million, of which IBRD \$18.44 million).* This component will create the 220 kV transmission line by which the power generated by TSHPP is moved to electricity consumers. It will support the construction of a line from the hydro plant's switchyard to a grid connection point an estimated 65 km away in Tan Lac District in Hoa Binh Province. It will finance transmission line goods including towers, insulators, conductors, optical ground wire and accessories, and the construction of the transmission line and a consultant to conduct independent environment and social monitoring of the component.

27. *The Social and Environment Impact Mitigation Component (cost \$43.42 million, of which IBRD \$23.81 million).* It will ensure the environmentally sustainable and socially responsible construction and operation of the TSHPP. It will consist of three subcomponents:

- (a) *Subcomponent 3a. Resettlement, Livelihoods and Ethnic Minorities Development (cost \$40.52 million, of which IBRD \$20.91 million)* will be the basis on which the Resettlement, Livelihoods and Ethnic Minorities Development Program (RLDP) will be implemented. The RLDP is the program by which TSHPP meets its social obligations to those affected by the project. It includes resettlement, rehabilitation, compensation and livelihoods development measures that will improve, or at least maintain, people's pre-project living standards and income earning capacity. It will also finance activities to help ethnic minorities to maintain their cultural identity. The Bank will not finance land acquisition or compensation payments.
- (b) *Subcomponent 3b. Health Support (cost \$0.60 million of which IBRD \$0.60 million)* will finance the implementation of the Public Health Action Plan (PHAP), which targets resettlers and others in the area, to ensure that any adverse health impacts resulting from the project are detected and mitigated.
- (c) *Subcomponent 3c. Environment Management (cost \$2.30 million of which IBRD \$2.30 million)* will finance other activities not covered by requirements placed on construction contractors which are financed under Component 1. It will include actions for the management of biodiversity and protected areas and physical cultural resources. It will also finance further studies on water quality, maintaining a part of the Ma river intact and cumulative environment impacts in the river basin. A significant amount of training and capacity building will also be undertaken for TSHPCo.

28. *The Capacity Development and Scale-up Component (cost \$3.0 million, of which IBRD \$3.0 million).* The Capacity Development and Scale-up Component will take advantage of the lessons learned during the development of TSHPP. It will finance capacity strengthening activities to bring EVN hydropower projects up to international standards. Support to be provided is expected to include studies on planning and implementation for social development; environment and health management, basin management plans integrated with other water uses, studies of cumulative impacts of projects, consideration of alternatives and mitigation measures; hydrology and dam safety; project preparation and management and preparation of financial and economic documents.

29. A detailed project description is at Annex 4 and project costs are at Annex 5.

#### **D. Lessons learned and reflected in the project design**

30. *Accord equal or even higher priority to social and environment issues during preparation and implementation.* Hydropower projects are often led and implemented by engineers, and in consequence technical issues dominate management thinking. Environment and social issues tend to be treated as secondary and implementation of mitigation plans often lag technical progress, and in consequence the impacts of the project on people are more severe and longer drawn out than necessary. High budgets are not correlated with success; key are dedicated teams within implementing agencies, and reflection of the social and environment issues in the project objectives and design.

31. *Design with sufficient flexibility to incorporate lessons learned during implementation.* In complex projects, early lessons in implementation can be used to improve project outcomes, particularly where there are long-term resettlement and livelihoods impacts. Advisory panels can be particularly effective by enabling a more objective view. Such panels' terms of reference and composition should be informed by the specifics of the project, the needs of the implementing agencies and regularly reviewed to ensure continuing relevance and appropriate staffing.
32. *Readiness.* In operations in Vietnam, including in the energy sector, implementation success has typically been constrained by the lack of readiness at project initiation. Project stakeholders – especially EVN and its subsidiaries – must have adequate capacity to undertake their roles in the project. The key to readiness, however, is to ensure that the main project activities have been well prepared and procurement is under way. Providing TA during preparation to potential participants is also an important factor in ensuring readiness.
33. *Provide investment lending and TA in one package.* It is preferable to combine TA with investment lending for two main reasons. First, investment lending on its own often results in slow uptake of new ideas because there are few opportunities for learning, and lessons learned cannot easily be disseminated. Second, TA on its own does not facilitate learning by doing.
34. *Fiduciary oversight and execution.* Oversight by government and its agencies is slow, particularly for procurement and disbursement. Projects which have minimized processing steps and approvals consistent with sound management and which encourage decision making have done better than those with multiple layers of oversight and approval.

## **E. Alternatives considered and reasons for rejection**

35. The main purpose of the project is to help satisfy Vietnam's growing electricity demands. One first key decision was what generation technology to support. The government expressed a preference for larger hydropower plants to be developed and owned by the public sector partly because of its interest in bringing its requirements for environment and social mitigation up to international standards, and partly because many hydropower plant are multipurpose and have public goods elements to them such as flood control and irrigation.
36. An early review identified that private sector financing could be more readily mobilized for thermal generation, especially gas, where build operate and transfer (BOT) power projects had already been demonstrated. While future reforms can be expected to make all forms of generation investment more attractive to the private sector, they are at an early stage and, understandably, private investors are somewhat reluctant to commit to the long development and construction periods as well as the additional reputational and other risks they perceive hydropower to have. A further factor appearing to discourage private investors is the relatively low financial returns that they could expect under the current pricing policy for generation, which uses a cost-plus methodology based on a low rate of return on capital. In consequence hydropower appeared to be the area where Bank intervention was most needed.
37. The analysis of alternatives included several dimensions: alternatives to supply side expansion; hydroelectricity in the optimum capacity expansion strategy; alternative hydro projects to Trung Son; and alternative dam sites at the Trung Son project level; and finally, alternative reservoir operating level for the selected site.

38. When social mitigation costs, the value of forest lost in the reservoir, and GHG emissions from reservoirs are taken into account, Vietnam's strategy for hydropower generation is justified economically, socially and environmentally. The site proposed for TSHPP was chosen because it was likely to cause the least social and environmental impact while meeting the objectives of this project with a potential for high investment returns. Given that the overall strategy requires the development of Vietnam's remaining economic hydropower resource endowment, Trung Son is one of the most attractive projects in the expansion plan.

39. Several options were considered on how best to support investment in TSHPP while also meeting the wider desire to improve project outcomes in Vietnam, including the social, environment and dam safety dimensions. An IBRD guarantee was rejected on the grounds that it would increase transaction and project costs excessively. A hybrid guarantee or SIL combined with a technical assistance loan was also rejected, because of Vietnam's historic reluctance to borrow for technical assistance, which was heightened by the proposed operation being the first investment to be financed by an IBRD loan. In consequence, a tightly integrated SIL was chosen.

### **III. IMPLEMENTATION**

#### **A. Institutional and implementation arrangements**

40. Trung Son Hydropower Company will implement the main project covering planning and contracting for the main dam and ancillary works including construction of the power lines and substations up to 110kV, and the access road and bridges and the social and environmental mitigation measures, covered by Components 1 and 3. It will also implement Component 4 on behalf of EVN, providing capacity building. The imminent restructuring of EVN, which is expected to occur within the next 12 months is to allow the introduction of the Vietnam Competitive Generation Market (VCGM). Under the new market rules, it is expected that EVN will be required to dispose of its generation assets except the strategic and multipurpose hydro plants. In consequence TSHPCo will be transferred to another owner. The creation of the special purpose company allows the disposal of the asset while also ensuring that critical covenants for the performance of the project can be retained with the new owner. TSHPCo will sign a power purchase agreement (PPA) with the Electric Power Trading Company (EPTC), the actor in the VCGM responsible for all power purchases from generators and all power sales to distributors.

41. Vietnam Electricity is the project owner. EVN's corporate Appraisal, Planning, Procurement and Finance and Accounting Departments have oversight of TSHPCo. The Procurement Department will undertake prior review of all contracts to be managed by TSHPCo and remain on hand to resolve any issues that arise from differences in opinions within TSHPCo on procurement processes. The Appraisal and Planning Departments of EVN will be involved in the Capacity Building and Scale-up Component at least in the early stages of the component's implementation. A Task Force, consisting of representatives of these departments and the Director of TSHPCo has been established, to allow EVN to oversee the project.

42. The National Power Transmission Corporation (NPT), a wholly owned one-member company subsidiary of EVN, through its Northern Power Projects Management Board (NPPMB) will be responsible for the design, construction, commissioning and operation of the 220kV transmission line to evacuate power from the hydropower plant into the national transmission

network. NPT enjoys substantial autonomy from EVN, with delegated powers for procurement, financial management and reporting.

43. Responsibilities for the implementation of the social and environment mitigation component are shared between province and district people's committees, TSHPCo, and contractors responsible for construction work. The People's Committees of Hoa Binh, Son La and Thanh Hoa Provinces are responsible for approval of the resettlement plans and compensation rates in the territories of their provinces. They manage provincial units responsible for health, agricultural outreach and natural resources and environment programs of the government and as such undertake both regulatory and implementation activities, with which TSHPCo coordinates. Provinces are also responsible for the management of the water resources within the territories of their respective province and in consequence have a role in river basin management, but this is not as yet an integrated function.

44. The People's Committees of Mai Chau, Moc Chau, Quan Hoa and Muong Lat Districts are responsible for the preparation and approval of the resettlement and compensation, in coordination with TSHPCo. They are also responsible for government health, agricultural outreach and natural resources and environment programs within their districts and for coordination with those undertaken by the project. TSHPCo will be responsible for ensuring that the RLDP is implemented, including delivery of the resettlement compensation, carrying out the Community Livelihoods Improvement Plans (CLIPs) for each village and the Ethnic Minorities Development Plan (EMDP) and their proper coordination with the government programs. Each District People's Committee is also responsible for ensuring that the environment management plan (EMP) is implemented in its territory, including supervising those aspects that are managed by contractors.

45. Works contractors, goods suppliers and consulting firms will collectively be responsible for construction, supply of goods and project management. A number of works and consultant services procurements, primarily associated with the road, are under advanced contracting and will be financed retroactively. Because of the strong engineering and technical skills available in Vietnam, contracts will be for works and goods, rather than turnkey type. This is in keeping with industry practice in which it is not usual to combine the significant works and goods components into a single turnkey contract for a hydropower plant. Such procurement approaches often fail since it is difficult to find contractors or equipment manufacturers that are willing to take the substantial risks and enter into joint and several liability undertakings in areas in which they are not familiar. Notwithstanding, the electro-mechanical equipment will be procured on a supply and install basis because of the need to ensure the equipment supplier bears the risk of the performance of the equipment according to specifications. Some works contractors will be responsible for implementation of those aspects of the EMP which are required under the contracts including, for example, the remediation of site works. Consultants will be responsible for monitoring social and environment performance and for supporting implementation.

46. EVN has been satisfactorily managing Bank projects for several years. TSHPMB has functioned from 2007 and managed a \$1 million PHRD Grant for preparation of this Project. The financial management function of TSHPCo has been equipped with adequate personnel and accounting systems. In general, TSHPCo personnel are technically strong, but need to have a more detailed understanding of their role and more detailed guidance on fiduciary and project management. Capacity building for TSHPMB started during preparation and will continue with TSHPCo during implementation. Independent advisors, particularly the Social and Environment

Panel of Experts (PoE) and the Dam Safety Review Panel (DSRP) will have an important role to play beyond the formal functions required under safeguards policies. The PoE will participate in the independent grievance process, while the remit of the DSRP will be expanded to become a Project Technical Advisory Panel (PTAP) to include more general engineering advice. EVN departments and NPT, which will be responsible for some components of the project, are satisfactorily implementing several parts of ongoing Bank-financed projects.

47. The project will require close supervision, particularly during the first year of implementation, and with a focus on procurement, financial management, governance and accountability, resettlement compensation and project communications. A supervision plan has been developed and budgeted. This and other details of implementation arrangements are at Annex 6.

## **B. Monitoring and evaluation of outcomes/results**

48. Monitoring of the project's progress towards its objectives will mainly be the responsibility of TSHPCo. Physical implementation progress will be monitored by reference to the project timetable and will be supported by the supervising engineer. Progress in the implementation of the RLDP will be measured through formal surveys, and TSHPCo will be supported by specialist consultants to carry this out, and by Independent Monitoring Consultants (IMCs). TSHPCo will provide periodic reports to EVN and the Bank on those aspects of the project for which it is responsible.

## **C. Sustainability**

49. The keys to sustainability in Vietnam's power sector are to ensure that the sector continues to meet demand, that benefits of investments exceed their costs, and that costs are recovered from electricity consumers. Vietnam has a good track record to date: the government has shown strong commitment to the reform process which has largely been driven by the need to ensure demand in the fast-growing system is met, through gaining access to diversified sources of finance, skills, technologies, and fuels. Investment planning is sound. Although EVN's and NPT's profitability has declined in recent years, the reform process has strengthened sustainability by building the regulatory framework, setting the stage for further unbundling of generation, transmission and distribution. Government has reformed wholesale and retail tariff setting by establishing clear and transparent methodologies. It has recently shown increased interest in developing the power sector in an environmentally sustainable manner. The development of hydropower resources is critical to the achievement of this goal.

50. The sustainability of the TSHPP relies on the establishment of a tariff that will allow the full recovery of the investment and operation and maintenance costs. The PPA into which TSHPCo will enter with the EPTC will be a standard type for all generators, which provides for prices and terms that ensure cost recovery and include indexation for cost increases and exchange rate changes. It will have a set lifetime of ten years. By the time it expires, the Wholesale Competitive Market (WCM) is expected to be in place. The WCM provides for the competitive sale of power by generation companies and their individual plant to large consumers such as the Power Corporations (PCs) which are responsible for power distribution. TSHPP's cost of electricity as indicated by the financial analysis suggests that it will be well below the avoided cost of power to PCs and will therefore experience little difficulty in finding a long-term offtaker.



## D. Critical risks and possible controversial aspects

51. The project overall risk rating is assessed to be high. There are a number of key risks, particularly at the project level, stemming from the main implementing agency, TSHPCo: limited capacity leading to poor fiduciary management, cost overruns or delays, and weak implementation; potential for fraud and corruption; and social and environment risks. Several more risks are assessed as having a low likelihood of occurring, but with high impact on the project if they do including: stakeholder and country risks; governance, particularly during the power sector reforms; and delivery quality. There is a sufficient number of risks at this rating to suggest there is a high risk of at least one occurring. Sector risks are generally low. Table 1 summarizes the risks, mitigation measures and ratings before mitigation.

**Table 1: Risk Summary**

Potential Risks	Proposed Mitigation Measures	Rating Before Mitigation
<i>Country Risks</i>		
Following the 11 <sup>th</sup> Party Congress, a major political transition is under way and will continue throughout the first half of 2011 which could affect the program for reform and the broad reform agenda.	Continued dialogue with government agencies and stakeholders to keep abreast any major change to the reform policies.	Medium: low likelihood, high impact
Weaknesses in the rule of law may result in conflicting or vague legal environment; limited capacity of oversight institutions has a significant impact while the policy of decentralization has stretched local counterpart capacity, especially in the poorest provinces.	Government efforts are under way to reform the judiciary and public administration and to make the law making process more open and transparent. Dialogue includes measures aimed at increasing transparency in public administration.	Medium: low likelihood, high impact
Risks of fraud and corruption in the procurement process undermines project quality, causes delays in procurement, and could undermine the Bank's reputation (project level risks are discussed below).	The Bank, building on the recent VDR, and together with other donors (including through the Anti-Corruption Dialogue), has been helping the Government develop a strategy for improving systems of prevention and detection of collusive and corruptive practices. As part of the Six Banks grouping, the Bank has promoted the strengthening of FM and procurement country systems.	Medium: low likelihood, high impact
Volatile macroeconomic management, with a tendency for policy overshoot breeding market anxiety. Exchange rate risks, with an informal peg to US dollar causes occasional hoarding of hard currencies and consequent lack of liquidity. Deficit on current account offset by higher capital account, and international reserves limited to an estimated two months of imports. Sizeable fiscal deficits although debt is considered sustainable.	Continued dialogue and policy advice, in collaboration with IMF. Monitoring and analysis of macroeconomic and financial indicators. Ongoing technical assistance to strengthen legal, regulatory and supervisory framework.	Medium: low likelihood, high impact

Potential Risks	Proposed Mitigation Measures	Rating Before Mitigation
<i>In the Sector Generally</i>		
Slippage in reform.	<p>The need for a strong and well-functioning power sector is widely understood within government. The main challenge facing the power sector, namely ensuring that demand is met, is understood at all levels and that power sector reform, aimed at attracting more investment in generation, is central to this need. Government has recently endorsed the reform program for the power sector.</p> <p>Slippage in reforms will not impact the ability of the project to meet its objectives, since under any power sector market or structure, the supply of least cost power in a safe and environmentally and socially sustainable way would remain desirable.</p> <p>Reform of the power sector and restructuring of EVN are expected to remain on track. The Bank has a strong policy dialogue and a series of Development Policy Operations under way. The reform process is designed to mitigate the risk of backtracking. The two-step, pilot and implement approach builds on the consensus driven approach to decision making in Vietnam.</p> <p>Continued engagement of EVN – including through the proposed investment project – helps ensure buy-in.</p>	Low
<p>The main sector challenges are:</p> <ul style="list-style-type: none"> <li>(i) implementing the reform program;</li> <li>(ii) restructuring EVN; and</li> <li>(iii) uncertain financial performance of EVN and other sector players. There is a risk that these will cause disruption at the sector level.</li> </ul>	<p>Continued financial sustainability of the sector depends in large part on generators recovering full costs when selling into the VCGM. Ensuring tariff reforms deliver increases is therefore important.</p> <p>The first round of reforms to allow annual adjustments has been satisfactorily implemented and the second round, allowing quarterly adjustments for fuel price changes, is now under way. Mitigate risk of backtracking through continued engagement, especially through Development Policy Operations.</p> <p>Creation of TSHPCo and covenant its financial performance.</p> <p>Covenant financial performance improvement plan for NPT.</p>	Low
There is some risk that governance could deteriorate and fraud and corruption increase during the reform process.	Continued vigilance during project implementation across the whole portfolio.	Low
Waning interest in applying best practices in environment, social or dam safety to other hydropower projects.	Continued dialogue with EVN to show benefits of applying international best practice.	Low

Potential Risks	Proposed Mitigation Measures	Rating Before Mitigation
<i>In the Project</i>		
<p>EVN, knowing that it will soon lose responsibility for generation may focus less on its investments and project pipeline in the subsector.</p> <p>NPT management, with its relatively small involvement in the project may lose sight of implementation.</p>	<p>EVN senior management has demonstrated its commitment and project agreements recognise continuing role of EVN. Nonetheless the Bank will need to ensure its continued engagement and discuss staffing regularly.</p> <p>NPT has an interest in maintaining the long term relationship with the Bank through other projects and access to management is ensured.</p>	High
<p>Weak capacity of TSHPCo, and limited experience of its staff with World Bank-financed projects and large project size lead to additional work load during implementation, particularly procurement, supervision of contracts, and managing social and environmental aspects. May be worsened by staff turnover. Risks of:</p> <ul style="list-style-type: none"> <li>(i) Project financial management and procurement management weaknesses;</li> <li>(ii) Strain on staffing, systems and processes resulting from additional work load during implementation leading to cost overruns or implementation delays;</li> <li>(iii) Lack of management capacity or attention, leading to poor outcomes for project affected people and health and safety issues including construction accidents.</li> </ul>	<p>Continue process of strengthening TSHPCo through capacity building and consultant assignments; ensure adequate budgets. During implementation, use of consultants in areas of risk, particularly supervision of main works contracts and monitoring of environment and social programs.</p> <p>Ensure adequate staffing of TSHPCo and alignment of structure towards implementation, staff training.</p> <p>Creation of Task Force from experienced EVN departments to provide knowledge of Bank and EVN relationship, procedures and systems and to involve EVN in project oversight. Strong supervision by Bank, especially during first year.</p>	High
<p>The power sector is undergoing significant reforms at the moment, and EVN is to be restructured. The restructuring will require TSHPCo to sell power into the VCGM or its successor, the wholesale competitive market.</p> <p>On current expectations, EVN will be required to dispose of generation assets including TSHPP. There are some risks of transition as the future owner of TSHPP is not known at present or that the plant may be orphaned and unable to sell power into the market.</p>	<p>Maintain close dialogue on reform through other operations, particularly the Power Sector Reform Development Policy Operations series. Although orphaning unlikely (Vietnam is short of power and expected to remain so). A memorandum of understanding on the power purchase agreement has been signed between Single Buyer and TSHPCo.</p>	Medium: low likelihood, high impact
<p>There are risks of waning interest of government or EVN in the broader agenda which may communicate as lack of interest in the project. This risks turnover of key staff at TSHPCo that will affect its ability to implement the project to time and quality and subsequently to operate the project effectively, thus reducing its development impact.</p>	<p>Continue to support TSHPCo through capacity building and consultant assignments financed as part of the project and ensure adequate budgets. Proactive engagement between the Bank and the Task Force. Ensure continued EVN senior management commitment to project. Discuss staffing with EVN management regularly</p>	Medium: low likelihood, high impact
<p>Fraud and corruption risks in hydropower projects are generally high globally. While there has been good oversight of TSHPCo by EVN's procurement and finance and accounting departments, the inspection function – responsible for investigating allegations of wrongdoing – is weak and the incentives for fraud and corruption are strong.</p> <p>There have been allegations of collusion and fraud in the procurement of contracts for the access road and bridges for Trung Son which have been referred to the relevant authorities in EVN. EVN managers cancelled the bidding and replaced four TSHPCo staff. These complaints were also reported to INT.</p>	<p>A Governance and Accountability Framework(GAF) has been prepared and adopted by TSHPCo that addresses weaknesses in the control environment.</p> <p>EVN senior management has demonstrated its commitment to eradicate fraud and corruption; nurture its interest and willingness to try new approaches. EVN and TSHPCo management have agreed to use project as a pilot for new approaches to apply across whole of EVN.</p>	High

Potential Risks	Proposed Mitigation Measures	Rating Before Mitigation
<p>The project uses well-proven technologies for the main civil works, power generation facilities and ancillaries including the roads and the transmission line. Vietnam and EVN has experience of these technologies and of their application in hydropower projects but some residual risk remains.</p> <p>Hydrological risks have been extensively reviewed, and the impacts of climate change and other factors on the economic and financial viability of TSHPP have been reviewed.</p> <p>Risk in the TA component is limited by design.</p>	<p>Mostly mitigated during preparation by working closely with EVN, TSHPMB and its consultants.</p>	<p>Low</p>
<p>By design, the project includes environment and social objectives which are aimed at ensuring that World Bank standards are followed for environment and social performance.</p> <p>Generally the intent to follow policies and agreements is strong, but capacity and ability to adjust to changing circumstances is weak. Failure to achieve these outcomes will jeopardize achievement of the project objectives and will have direct impact on livelihoods of people affected by the project and may bring about a change in public attitudes towards the project and the Bank (as well as to the government) thus delaying or hindering achievement of PDO.</p>	<p>Great care has been taken to build capacity and ownership for these areas during preparation, with some success. Much attention has been paid to the quality of the EIA/EMP and RLDP.</p> <p>Piloting of key aspects early, particularly livelihood development activities and adaptive management will help mitigate risk but cannot be started until the project is approved.</p> <p>A community relations plan, which includes complaint and grievance handling mechanisms has been developed.</p> <p>A further mitigation is to stand ready to extend the project and provide additional financing if further livelihoods development is required.</p>	<p>High</p>
<p>There is some risk that weak project management will slow delivery and cause surprises. Coordination between TSHPCo and NPPMB to ensure TSHPP and the transmission line are completed at the same time will be needed. Internal coordination of TSHPCo and with its contractors will be tested as a result of the volume of work and number of contracts: TSHPCo has a poor record of payment of invoices during preparation, and still has some improvements to make to its contract management mechanisms.</p> <p>There is strong ownership of project and the method of delivery with O&amp;M costs to be covered from revenues. There is some risk that the new owner of TSHPP following restructuring of EVN may be less willing or able to ensure continued high quality operations.</p>	<p>M&amp;E mechanisms are being put in place, particularly on social and environment safeguards. Ensure adequate M&amp;E data collection methods, which involve beneficiaries to monitor delivery in terms of quality and timing.</p> <p>Continued capacity building and monitoring of the TSHPCo's performance in preparation and construction phases.</p> <p>Monitor performance closely during supervision, including of progress, costs, counterpart financing and quality.</p> <p>Build project milestones into legal agreements.</p>	<p>Medium-L (Low Impact/ High Likelihood)</p>

Potential Risks	Proposed Mitigation Measures	Rating Before Mitigation
<p>TSHPCo may not have adequate financial performance, particularly because at this stage there are risks of cost increases and delays in completion. Further, it is quite highly geared and has high foreign exchange exposure.</p> <p>EVN's financial performance was unsatisfactory in 2008 and 2009 owing to a combination of lack of tariff increases and foreign exchange losses (EVN has substantial borrowings in Yen, US Dollars and Euros). The first half of 2010 was also poor, because it was unusually dry and cost of generation rose and this has resulted in weak full year results. There are risks that EVN will not have sufficient resources to fund its obligations to TSHPP.</p>	<p>The standard PPA for the VCGM includes indexing of the tariff and for foreign exchange exposure. Pricing is based on a fixed rate of return. Hence cost of foreign exchange, delays and cost overrun risks are taken by the purchaser and, thence through the tariff regulations by the consumer.</p> <p>Separation of TSHPCo from EVN makes general financial health of the shareholder (EVN) less important, planning for and addressing this risk easier and creates transparency in transactions between the two and allows better monitoring.</p> <p>Ensure adequate covenants on TSHPCo for performance, which can continue regardless of ownership, and ensure any transfer is to reputable owner.</p>	Low

## E. Loan/credit conditions and covenants

52. All standard conditions of effectiveness will apply. In addition, subsidiary loan agreements must be signed between MoF and TSHPCo, NPT and EVN. Standard covenants on anti-corruption, safeguards, reporting, financial management and auditing and procurement will apply.

53. The following non-standard covenants will apply:

- (a) TSHPCo. Following commercial operation of TSHPP and as long as TSHPCo remains a single purpose company, it must maintain a debt to equity ratio of 85:15 a debt service cover ratio (DSCR) of 1.3 and a self-financing ratio of 25 percent. TSHPCo will be required to prepare a rolling five year financial plan, update it annually and to provide it to the Bank for its review. Dividend payments in any year shall be covenanted not to exceed net earnings minus six months' of total cash expenditure requirements consisting of the sum of operations and maintenance expenses, taxes and debt service. TSHPCo will be required to maintain the PoE, PTAP and POM, and to implement the GAF. Changes to the agreed project timetable, the POM and the GAF will require the agreement of the Bank during implementation. TSHPCo will be covenanted to provide livelihood restoration support for those households which lost more than 10 percent of productive assets as a result of resettlement for the access road and to include a similar provision in the RP for any power line. In the event that TSHPCo ceases to be a single purpose company, or its assets are transferred into another company, then as part of the Bank's no objection, a further covenant will be added to the Project Agreement to require TSHPCo or the new owner to maintain a debt to equity ratio not to exceed 70:30, a debt service cover ratio of 1.5 times and a self financing ratio of a minimum of 25 percent.
- (b) NPT. In 2011 and 2012, NPT must maintain a self financing ratio of at least 20 percent and 25 percent thereafter. In 2011-2013, it must maintain a debt to equity ratio of 80:20 and 75:25 thereafter. The DSCR must be at least 1 times in 2011, 1.3 times in 2012 and 1.5 times thereafter. NPT will be required to prepare an RP for the transmission line in which provision is made for livelihood restoration support for those households which lost more than 10 percent.

- (c) EVN. EVN or its successor as Single Buyer and TSHPCo to enter a power purchase agreement at least one year before operation of TSHPP. Transfer of TSHPCo to another owner in whole or in part, or change of legal status of TSHPCo will be subject to the Bank's agreement. EVN will be covenanted to pay its share of project costs into TSHPCo as equity according to an agreed schedule. EVN will be required to maintain a Task Force consisting of staff from key departments and the Director of TSHPCo for the project duration. In carrying out studies under the Capacity Building and Scale-up Component, EVN will be bound by the requirements of the Bank's safeguards policies.
- (d) Institutional arrangements including maintaining adequate organizational and staffing structure at TSHPCo, and establishing a Task Force at EVN, and maintaining the NPPMB at NPT.

#### **IV. APPRAISAL SUMMARY**

##### **A. Economic and financial analyses**

54. Vietnam has gone through an extraordinarily turbulent few years, starting with an episode of overheating in 2007, followed by the global financial crisis in 2008-09. The inflation rate was 11.8 percent at end 2010, compared to 6.5 percent at end-2009 and 19.9 at end 2008. The Dong, which is pegged informally to the US dollar, has been under pressure to devalue with the parallel market premium hovering around 10 percent in recent months. Recently, Vinashin, a large SOE, defaulted on one of its loans to external creditors, triggering downgrade by major credit agencies of its and sovereign bond ratings. On the other hand, the Government has recently indicated that stabilizing the economy is its first and foremost goal for 2011 and has approved Resolution 11, which commits the government to a wide range of monetary, fiscal and structural policy reforms that are intended to cool an overheated economy. These policy measures constitute a credible plan for Vietnam to regain macroeconomic stability. At the same time, government and government-guaranteed debt is deemed sustainable (Debt Sustainability Analysis 2010), with external debt outstanding as of end 2010 estimated to be just over 30 percent of GDP, and mostly contracted on concessional terms. The government has a track record of fiscal prudence, and the monetary authorities are taking actions to stabilize the macro-economy.

55. This operation makes adequate provisions for potential effects of exchange rate and inflation fluctuations, the most likely sources of possible macroeconomic turbulence during the project implementation. The proposed loan will provide 80 percent of the project cost in US dollars, and the expenses are expected to be denominated roughly evenly between domestic and foreign currencies. The foreign component is expected to be largely in US dollars or US dollar-linked. In the event of large appreciation of the local currency, the domestically-denominated component will become more expensive. Tariffs will be collected in domestic currency, and the power purchase agreement includes provision for adjustment if exchange rate fluctuations affect costs or debt service burden. Higher inflation in Vietnam will increase the nominal costs of the domestic component, but as the loan will be denominated in US dollars, the impact on the project cost will be limited. The proposed operation has internalized the lessons from the spike in inflation in 2008, and contracts will include a price-escalation clause to ensure the works continue in the event of changes in the rate of inflation.

### ***Project economic analysis***

56. Cost benefit analysis has been conducted for the TSHPP. The main economic benefit of the project is from the avoided cost of thermal energy generation and related avoided environmental costs. Other benefits include some avoided thermal capacity, improved agricultural productivity from better irrigation provided by the dam, and flood control benefits.

57. Avoided generation costs are assumed to arise from the displacement of the least efficient of the existing coal projects in the north during the wet season, and gas fired generation in the south during the dry season. Coal and gas fuel prices are assumed to be linked to world market prices for the fuel (that is, they are not subsidized). Actual financial costs are assumed to be the same as economic costs (in other words that there are no major distortions in the cost of labor or materials).

58. Based on these assumptions, the baseline economic rate of return (ERR) is estimated at 18.9 percent, and the net present value is estimated at VND 7,038 billion (\$361 million). The levelized economic cost is 963 VND/kWh (4.9 US¢/kWh). If the social value of greenhouse gases (GHG) is included at \$30/ton CO<sub>2</sub>, the ERR increases to 21.0 percent. If TSHPP displaces only coal then the ERR falls to 16.0 percent, but if the higher carbon emissions avoided are also taken into consideration, it increases the rate back to 18.9 percent. If TSHPP displaces only gas, then the ERR increases to 21.3 percent, but when carbon emissions avoided increase the ERR only a little more, to 22.9 percent. The project is thus robust to fuel substitution effects.

59. Sensitivity analysis was conducted to review the impacts of changes in key parameters with the results summarized in Table 2. The switching value is the amount by which the factor must increase or decrease to reduce the ERR to the hurdle rate of ten percent. The switching values are all highly unlikely, indicating robustness of economic returns to the main assumptions.

**Table 2: Economic Switching Values**

<b>Factor</b>	<b>Switching Value</b>
Construction costs increase	By 235 percent
Construction delays	Five years and a 62 percent cost overrun
Generation decreases	To 365 GWh
World oil prices decrease	To \$42/bbl
Higher sedimentation rates reduce active storage	>10 times greater
Firm capacity less than expected	Even if zero firm capacity, above hurdle rate
Climate change reduces inflows	MoNRE “rapid decline” scenario leaves ERR above hurdle rate

60. A Monte Carlo risk assessment of the economic returns has been carried out with variations in key parameters for oil price, capital cost, firm capacity, generation, operations and maintenance costs and climate change. The probability of the ERR not reaching the hurdle rate of 10 percent is estimated at 1.9 percent.

### ***Project financial analysis***

61. Project financial viability was assessed on the basis of financial rate of return (FRR) and financial net present value (FNPV). The weighted average cost of capital (WACC) is used as the basis for comparison. Debt cost was calculated on the basis of the IBRD loan swapped to a 30 year fixed rate, together with a fee from the Ministry of Finance for guarantees. The cost of equity was estimated in two ways: one based on the estimated market cost of equity and one based on a draft government regulation which fixes it at 10 percent. Based on the estimated

market cost of equity, the WACC is 6.46 percent on a real after-tax basis. Based on the assumption that the cost of equity is instead fixed at 10 percent, the WACC is 4.72 percent, also on a real after-tax basis.

62. Pricing was set at the minimum level required to make the project financially viable and the contracted energy output assumed to be the level estimated from the feasibility study, of 1,019 GWh/year. Using these levels, for the market rate based WACC, the energy price would have to be VND 753/kWh (or about 3.9 ¢/kWh). For the WACC based on the fixed cost of equity, the energy price would have to be VND 607/kWh (or about 3.1 ¢/kWh). Even at the higher price, the project is competitive with other existing or planned facilities, which have selling prices to EVN from about VND 550/kWh to VND 750/kWh. The estimated price for a hydro project completed in 2009 with output similar to Trung Son was initially set at about VND 650/kWh. Sensitivity analysis relating to project costs suggests that FIRR will lie between 4.0 and 8.0 percent and that there is an 80 percent probability it will be between 5.2 and 7.0 percent. The analysis assumes that there is a much greater risk of cost overrun than of under run.

### ***Corporate financial analysis***

63. TSHPCo. The projected financial performance of TSHPCo has been reviewed. The projections were based on all operating revenue and expenses, capital investments, loan repayments and borrowings estimated to be incurred by TSHPCo over the forecast period of 2011 to 2030. Since the scope of the company is limited to the construction and operation of the TSHPP, all revenues and expenditures earned and incurred by the company relate entirely to this project. Operating revenues consist entirely of project energy sales while recurrent expenses are limited to those for the operation and maintenance of the project. Similarly, capital expenditures are limited to that for the initial construction of TSHPP, as well as subsequent replacements of equipment over the life of the facility. Debt consists entirely of the on lent proceeds of the IBRD loan.

64. The projections indicate TSHPCo should be profitable in all years over the life of the project with the possible exceptions of 2018 and 2019, in which net losses of VND 27 billion (\$1 million) and VND 4 billion (\$0.2 million) are projected because of a combination of the start of loan repayments and the recognition of expected foreign exchange losses incurred during project construction. Thereafter, profits are projected to be stable and gradually increase in line with increases in the energy tariff. The return on net fixed assets (RNFA) is projected to increase from -0.1% in 2019 to 18.2% by 2030. The improvement in the return on equity (ROE) is projected to be even more significant, increasing from -0.4% in 2019 to 68% in 2030. The company is projected to earn a positive net cash flow in all years over the project operating life. The debt service cover ratio is projected to be satisfactory in all years, though at the low end of the acceptable range in the early years. Tailoring repayments through a disbursement linked repayment schedule will help ensure that debt service capacity is maintained.

65. EVN. EVN has met the three main financial covenants agreed to between EVN and IDA under existing projects. However, for the debt service covenant, EVN could only meet the level to which it was waived by the Bank for 2009. The debt-service coverage ratio (DSCR) was 1.1, above the waived covenant minimum of 1.0, but below the 1.5 established under the original covenant. The self-financing ratio (SFR) was 32%, above the original covenant minimum of 25% and well above the 15% minimum agreed to for 2009. EVN also met the debt:equity covenant although the margin of compliance was narrow. The debt to equity ratio at the end of 2009 was 68:32, just below the 70:30 maximum set under the covenant.



66. EVN incurred a net loss in 2009, primarily due to the large foreign exchange loss on its foreign currency debt. The net loss for the year was VND 1,433 billion (\$84 million) on sales of VND 78,968 billion (\$4.61 billion). It was substantially better in 2009 than in 2008. In 2008, the net loss was VND 7,319 billion (\$442 million), five times larger than that in 2009. The much lower net loss in 2009 was due to two main factors. First, the foreign exchange loss incurred in 2009 was over 40% less than that in 2008. Second, electricity tariffs were increased in March 2009, while in 2008, there was no increase in tariffs. EVN's overall net cash flow in 2009 was relatively strong, ending the year with a cash balance of VND 18,576 billion (\$1.04 billion); overall liquidity was stable because the increase in cash was largely offset by an increase in short-term obligations.

67. At appraisal no audited data were available for 2010, but it is understood that EVN incurred losses in the first half of the year, mainly the result of having to use expensive fossil-fueled plant to replace hydropower that was not able to run owing to the unusually dry conditions and to meet a government mandate to minimize load shedding. In 2010, a further tariff increase of about 6.8 percent was agreed and became effective in March but this did not include a mechanism to compensate for changes in fuel mix. Despite this relatively poor performance, EVN is expected to have sufficient cash to permit it to meet its obligations to TSHPCo comfortably.

68. Further information on the project economic and financial analysis and review of TSHPCo and EVN corporate financial performance is at Annex 9.

## **B. Technical**

### ***Hydrology***

69. Hydrological parameters for the feasibility study and designs were developed based on data from 15 meteorological stations, ten rainfall stations and 14 hydrological gauging stations throughout the Ma River basin with long-term records dating back to 1955. The rainy season at the dam site is from June to October. Long-term average rainfall in the basin is 1,420 mm per year. Annual average river flow is 234 m<sup>3</sup>/sec at the dam site. The annual peak flood normally occurs in August. The Probable Maximum Flood (PMF) is estimated at 31,000 m<sup>3</sup>/sec.

### ***Geology***

70. The dam foundation is primarily on one relatively weak, but hard rock foundation. Depth of excavation of overburden soils and weathered rock is expected to vary from 5-40 meters to reach sound rock for the dam foundation. Consolidation grouting to a depth of about five meters and a grout curtain to a depth of 15-40 meters below the base of the dam will be required to reduce the permeability and improve the stability of the rock in the foundation. The reservoir perimeter consists of impermeable bedrock formations that will prevent water loss into the rock formations or into other basins.

71. The dam will be located in an area of potentially strong seismic activity. Geological studies completed for the project estimate the Maximum Credible Earthquake to be a 6.07 Richter event with a horizontal peak ground acceleration of 0.24g. The Operating Basis Earthquake was estimated to produce a horizontal peak ground acceleration of 0.16g.

### ***Choice of dam type***

72. Three dam types were considered: roller compacted concrete (RCC), concrete faced rockfill (CFRD) and earthfill. There is insufficient soil overburden for an earthfill dam. The

CFRD would require the spillway to be located on the abutment, which significantly increases the quantity of excavation and the total cost for the dam and spillway. The RCC dam has the advantage of the spillway being integral with the structure and located in the riverbed, which not only reduces total excavation quantities, but also reduces the potential for excessive erosion of the river bank downstream of the spillway.

73. The dam structure will have sloping upstream and downstream faces to provide the mass required to resist the forces from earthquake and PMF loadings. It will contain 774,000 m<sup>3</sup> of RCC and 369,000 m<sup>3</sup> of conventional concrete (CVC). The spillway will contain six large radial gates, each 14 meters by 15 meters to maintain the reservoir water level and control discharges. A flip bucket and plunge pool at the base of the spillway will dissipate energy in the spilled water. The maximum spillway capacity is 13,056 m<sup>3</sup>/sec with all gates open and the reservoir at maximum water level elevation 162.2 meters.

74. The best source of rock for the production of aggregate for RCC and CVC for the project is the quarry on the left bank of the river approximately 8 kilometers upstream of the dam site above the normal reservoir water surface. A sufficient layer of granite rock is available for aggregate production at this quarry site. The best source of sand appears to be from crushing the granite to produce aggregate for RCC and CVC.

### ***Civil works***

75. The power waterway intake for the hydroelectric powerhouse is located on the left abutment of the RCC dam. Four intakes and penstocks will supply water to the powerhouse. The intake gates are each 5.5 x 5.5 m. The steel penstocks are 5.5 m in diameter and about 230 m long. The powerhouse will contain four 65 MW Francis turbines each designed for a flow of 510 m<sup>3</sup>/sec and a maximum water head of about 72 m.

76. A fuse dam and emergency spillway will be constructed in a natural draw near the left abutment of the dam and prevent overtopping of the main dam during the PMF. The fuse dam is 23.8 m high with a crest length of about 109.4 m at elevation 162.8 m and will be constructed using materials from nearby borrow areas. The emergency spillway has a width of 62.0 m at elevation 140.0 m and a capacity of 16,010 m<sup>3</sup>/sec.

77. The estimated sediment accumulation in the reservoir upstream of the dam at the end of 100 years of operation is approximately 110 million m<sup>3</sup> which would reach about 37.26 meters below the base of the power intakes. To mitigate the risk of increased rates of sedimentation, the reinforced concrete diversion conduit located on the left side of the river at the base of the dam to bypass river flows during construction will be converted to perform as a sediment sluice during operation. The total capacity of the diversion conduit is 6,200 m<sup>3</sup>/sec, which is equal to the estimated flow for the 20-year flood. Additional benefits of including a sediment discharge are that it would: reduce the size of the emergency spillway needed to pass the PMF; enable dewatering of the reservoir to 86m elevation for maintenance; ensure an environmental flow during filling and dry seasons when there was insufficient volume to run a single turbine; and allow both reservoir top water and bottom water to be discharged, thus improving downstream water quality.

### ***Operations***

78. Trung Son Hydropower Plant will provide no seasonal carryover storage. It will operate as a daily peaking project during the dry season, and in effect as a baseload plant for much of the wet season when all four units run 24 hours a day for extended periods. To provide for flood

control storage during the wet season, the reservoir is operated at the lower level of 150m. The flood control storage of 112.13 million m<sup>3</sup> is sufficient to absorb an average daily flow of 1299 m<sup>3</sup>/s. If there are several days of flows between the maximum discharge capacity of all four turbines (522 m<sup>3</sup>/s) and 1299 m<sup>3</sup>/sec, spill will result.

79. In the dry season, TSHPP is to be operated for daily peaking. The inflow is not sufficient to run all units at full power all day, but by storing the inflow in the off-peak hours, full turbine discharge can be achieved during the evening peak. In very lean dry seasons, the flow may be less than 52 m<sup>3</sup>/s and thus be unable to support the minimum required for one turbine; discharge from a low-level outlet is unavoidable if environmental flows of 15 m<sup>3</sup>/s are to be maintained.

80. Another constraint concerns the maximum rate of change of downstream flow. A rapid increase from 52 m<sup>3</sup>/s to the full turbine discharge of 522 m<sup>3</sup>/s may be technically possible, but would result in sudden increases in the tail water elevation in addition to the sudden increase in the discharge volume. At 52 m<sup>3</sup>/s, the tail water elevation is 88.9 meters, rising to 90.2 metres at 522 m<sup>3</sup>/s. Unexpectedly rapid rises downstream of the dam have safety and environmental implications hence the rate of change in downstream flow should not be greater than that which occurs without the project, which is estimated to be a maximum average rate of change of 40 m<sup>3</sup>/s per hour.

## **C. Fiduciary**

### ***Financial management***

81. The financial management (FM) assessment of TSHPMB completed in March 2010 concluded that the project has adequate FM arrangements acceptable to the Bank. TSHPCo will adopt the systems put in place by TSHPMB and will remain under the oversight of EVN, hence the FM assessment is not changed by the creation of the special purpose company. Other implementing agencies, EVN and NPT through its NPPMB, have adequate FM staff capacity and have been managing Bank projects satisfactorily from an FM perspective for several years. The overall arrangements the Borrower has in place for implementation provide reasonable assurance that the proceeds of the loan will be used for the purposes intended. As a condition of participation in the project TSHPCo and NPT will be required to have accounts audited to International Financial Reporting Standards (IFRS) and published according to the Bank's information disclosure policy. The FM risk is assessed to be substantial. Further details of the FM assessment and proposed arrangements are at Annex 7.

### ***Procurement***

82. A procurement capacity assessment of TSHPMB carried out in July 2010 by the Bank found that it has some experience of Bank-financed procurement, and that given the oversight of EVN's Procurement Department it has adequate procurement experience as well as institutional and organizational capacity in place to carry out procurement for those parts of the project for which it is responsible. Other implementing agencies, EVN and NPT through its NPPMB, have been implementing Bank-financed procurement satisfactorily in several other projects and have adequate capacity to undertake procurement under their respective components/subprojects. The high procurement risk rating is due to the high value of the packages and differences between Vietnamese Law and the Bank's policies and Guidelines which could lead to delays in the procurement process. It may, after mitigation, be reduced to substantial. To mitigate the identified risks and strengthen the implementing agencies' procurement capacity, the Bank has proposed specific actions which are summarized in Annex 8.

## **D. Social**

83. Access to improved quality and availability of electricity is a long-standing government commitment. Construction and operation of hydropower facilities are likely to generate employment opportunities. The benefits from economic growth and of improvements in the quality of people's lives are well understood, including increasing income through improvements in job prospects and productivity. The positive direct and indirect social benefits of electrification are well recognized in Vietnam and supported by central and local governments, mass organizations, and individuals. These social benefits are too dispersed to be easily monitored within the project, but other Bank activities monitor the impacts of electricity availability on businesses and of electrification on households. The policy of universal access to electricity is applied even-handedly, including for members of ethnic minorities.

84. Previous in-country experience in developing hydropower projects shows that they cause change in land use and impact the lives of people living in the project areas. These projects are also likely to be located in hilly areas where, in Vietnam, ethnic minorities live. The adverse social impacts of the project are largely felt at the household level. Strenuous efforts have been made to minimize impacts by system designers, and land holders who lose the use of their land will be compensated and livelihood restoration addressed. By contrast with the difficulty of monitoring the beneficiaries of the project, monitoring of this group is possible by virtue of its narrow geographic spread and clear definition. This aspect is an integral part of the social mitigation plan for the project, discussed in greater detail below.

## **E. Environment**

85. Hydropower, as a renewable energy source, displaces thermal generation, and thereby avoids emissions of local and global pollutants resulting from burning coal, gas, and oil. The costs from local emissions, mainly in the form of damage to people's health, are likely to increase as Vietnam's levels of electricity consumption and urbanization increase. Hydropower energy provides low emission electricity, but can have other local environment consequences, including impacts on natural habitats and forests, flora and fauna, and to landscapes. It can result in emissions of local pollutants and GHG from the reservoir. Mechanisms are in place to mitigate these impacts, and will be assured through the application of the Bank's safeguards policies, discussed below.

86. At 19.8 Watts installed at the dam per square meter of reservoir area ( $\text{W/m}^2$ ), the power density of TSHPP is high and calculations of the expected GHG emissions from the reservoir based on data from Brazil suggests that these will be less than one percent of the avoided emissions from thermal generation. During the wet season Trung Son will displace the least efficient coal plant that would otherwise have to run; this is estimated to avoid emissions of  $1.36\text{kgCO}_2/\text{kWh}$ . During the dry season, TSHPP will displace gas-fired peaking plant, which tend to be more efficient machines and will avoid emissions of  $0.45\text{kgCO}_2/\text{kWh}$ . Although not an explicit objective of the project, it is expected that net greenhouse gas emission reductions of the project will be in the order of 1 million tonnes  $\text{CO}_2/\text{year}$ . For further discussions, see Annex 9.

## F. Safeguard policies

<b>Safeguard Policies Triggered by the Project</b>	<b>Yes</b>	<b>No</b>
<a href="#">Environmental Assessment</a> ( <a href="#">OP/BP</a> 4.01)	[X]	[ ]
Natural Habitats ( <a href="#">OP/BP</a> 4.04)	[X]	[ ]
Pest Management ( <a href="#">OP</a> 4.09)	[X]	[ ]
Physical Cultural Resources ( <a href="#">OP/BP</a> 4.11)	[X]	[ ]
Involuntary Resettlement ( <a href="#">OP/BP</a> 4.12)	[X]	[ ]
Indigenous Peoples ( <a href="#">OP/BP</a> 4.10)	[X]	[ ]
Forests ( <a href="#">OP/BP</a> 4.36)	[ ]	[X]
Safety of Dams ( <a href="#">OP/BP</a> 4.37)	[X]	[ ]
Projects in Disputed Areas ( <a href="#">OP/BP</a> 7.60)	[ ]	[X]
Projects on International Waterways ( <a href="#">OP/BP</a> 7.50)	[X]	[ ]

87. The major environmental consequences of the project stem from the dam and the reservoir it will create. Direct impacts on biodiversity are considered minimal. The project will not flood any critical natural habitat. Fish migration in the Ma River occurs mainly in the lower and middle segments of the river basin up to 100 km from the river mouth while the distance from the dam site to the river mouth is approximately 200 km. Movement of fish upstream of Trung Son is not prevalent. Therefore impacts on fish and fisheries are also considered of low magnitude. Although some paleontological sites were identified in the area to be flooded, which will be excavated before flooding, the area of the reservoir does not have a rich cultural heritage value.

88. Beyond these impacts which could normally be expected from the change in use of the land, the construction of the dam itself poses perhaps the highest environmental and social risk. At its peak, a labor force of around 4,000 workers will be housed in camps for dam construction. Indirect impacts from them include about 400-1,000 “camp followers” moving into the project area prompted by the construction of the dam and the enhanced access provided by the roads. The resettlement of the population to new areas in the river basin will exert additional pressures on natural resources (forest, bamboo, wildlife) especially in the Xuan Nha Nature Reserve in the Son La Province, the Pu Hu Nature Reserve in the Thanh Hoa Province, and the Pa Co-Hang Kia Nature reserve in the Hoa Binh Province. Construction of the access road and transmission lines are expected to have minor impacts which can be easily mitigated, although quite large numbers of people will be affected.

89. A considerable resettlement and livelihood restoration program is required, particularly in the seven communes and one town which bound the reservoir and site for the main construction work. About 2,327 households or 10,591 people will be resettled from reservoir area, access road, dam construction sites, borrow pits and workers’ camps. This includes a preliminary estimate of 325 households or 1,625 people affected by the transmission line, construction of which is to be started in about two years’ time and the 486 households affected by the development of the access road. Programs to support public and worker health and to improve agricultural practices will involve the use of pesticides.

90. About 98 percent of all people so far identified as affected by the project are from four ethnic minority groups: the Thai, the Muong, the H’mong and the Kho Mu. Thus the project has the potential to disrupt cultural and social structures in the area, create additional pressure on community infrastructure and services, and increase the risk of spreading sexually transmitted

diseases. The less integrated ethnic minorities, particularly the H'Mong, are potentially the most vulnerable to the project impacts.

### ***Environment Management Plan***

91. Appropriate mitigation measures have been identified to address direct and indirect environment impacts from the project which are organized the Environmental Management Plan (EMP). The main components of the EMP are:

- (a) Construction Impact Management Plan – measures to minimize negative impacts of construction activities on local communities and the natural environment, to reduce the induced impacts of camp followers, to prevent pollution, to ensure health and safety of workers, to ensure hazardous materials including pesticides and wastes are safely handled and disposed of and that the site has been cleared of unexploded ordnance;
- (b) Biodiversity and Protected Areas Management Plan – measures to ensure protection of local and regional biodiversity and minimize project impacts on three adjacent protected areas;
- (c) Vegetation Clearing and Salvage Plan – measures to minimize biomass loss as a result of reservoir clearing and to coordinate timing to allow salvage benefits to local communities;
- (d) Environmental Monitoring Plan – measures to ensure project compliance, and the success of proposed mitigation, continue baseline monitoring and review environmental and social performance;
- (e) Community Relations Plan – measures to inform local communities on progress of the project and ensure community safety;
- (f) Public Health Action Plan – to mitigate project impacts on the health of local populations, construction workers, and camp followers and ensure safe handling of pesticides and waste;
- (g) Physical Cultural Resources Management Plan – measures to prevent any inadvertent loss of physical and cultural resources during construction and operation;
- (h) Additional Studies – additional studies are planned to improve information for the project covering the feasibility of maintaining one or more branches of the Ma River intact, on cumulative impacts of development in the region and on water quality.

### ***Resettlement, Livelihoods and Ethnic Minorities Development Program***

92. To address social safeguards issues, a Resettlement, Livelihood and Ethnic Minorities Development Program (RLDP) has been prepared. It includes a Resettlement Plan (RP), a Community Livelihood Improvement Plan (CLIP), and an Ethnic Minorities Development Plan (EMDP):

- (a) The RP of the main project (dam and support works) is designed to provide full compensation to all individuals losing houses, land or other assets due to construction, reservoir flooding or downstream impacts of the dam and to provide for effective relocation for households unable to stay in their current residence;
- (b) The CLIP enhances the capacity of communities affected by resettlement to restore and improve their livelihoods. Early piloting and vocational training needs

assessments will be used to refine the CLIP and customize it for villages and individuals;

- (c) The EMDP sets up a consultation and participation framework for use in all RLDP activities, and sets up measures to mitigate remaining risks for ethnic minorities, especially in health and culture;
- (d) The management and communication activity provides management capacity, communication, a protocol for adaptive management, formal and informal grievance mechanisms and a monitoring and evaluation system.

93. The RP, CLIP and EMDP form a single program because a significant proportion of project affected households are eligible for all three plans, and because implementation will be carried out in a largely integrated manner. Because almost all of the people residing in the project area are from ethnic minorities, the RLDP applies in its totality to ethnic minorities and has been designed in every part to address their vulnerabilities. The program includes measures for adaptive management, governed by a protocol to ensure that it does not conflict with the principles set out in the RPF, Bank Policies and the RLDP.

#### ***Access road and power lines***

94. Because the access road has been designed and will be procured and construction will start before the main work of dam construction and reservoir filling starts, a separate set of safeguards instruments were prepared and are being implemented. An RP, with an integral EMDP has been prepared, disclosed and its implementation has largely been completed, providing compensation and livelihood restoration to the 486 households affected by the road. There are 41 households affected by the access road that would come under the OP 4.12 definition of severe impact but which had not received the entitlements of severe impact at the time of original resettlement activities. TSHPMB will retroactively apply the entitlements for those 41 households. An EMP has also been prepared and its requirements included in the scope of work for the contractors which will construct the road, which are now being procured.

95. The transmission line will not be required until the project is completed and ready to export power to the grid; some power lines that supply power to the construction site will also need to be built or reinforced towards the end of the construction period. It was premature to prepare full RPs, EMDPs and EMPs for the power lines during project preparation and only preliminary estimates of the impacts of the power lines are available since detailed design and alignments have not yet been completed. Current estimates indicate about 325 households will be affected, the large majority only suffering minor impacts from the transmission line. A Resettlement Policy Framework for power lines has been prepared by NPT and was approved by the Prime Minister in October 2010. The RPF for the power lines defined severely affected households as the loss of 25 percent of productive assets. It has been agreed that the RP to be prepared by NPT would define severely affected to include the loss of 10% of productive assets consistent with the requirements of OP 4.12. An Ethnic Minorities' Planning Framework (EMPF) and Environment Guidelines (EG) have been prepared and adopted by NPT. During detailed design, NPT will prepare an RP, EMDP and EMP.

#### ***Environment and Social Panel of Experts***

96. A PoE was established early in project preparation and has provided advice and input in the definition, execution and review of background studies on social and environmental aspects of the project. The PoE is expected to have a continuing role during implementation, and its

composition and terms of reference will be adjusted. It is expected to include experts with experience of EMP monitoring, livelihood restoration and resettlement. The revised terms of reference for the PoE have been included in the Project Operations Manual (POM).

### ***Management, budget and monitoring***

97. The EMP and RLDP will be implemented by TSHPCo through its safeguards unit. A compliance framework has been designed including environmental supervision of contractors, independent monitoring consultants (IMCs). The PoE will remain operational during implementation of the EMP and RLDP, until they are complete. Monitoring of success of the EMP in reducing the expected impacts of the project on the environment and of the RLDP in improving livelihoods has been included in each plan (and are linked to project outcomes – see Annex 3). Community level monitoring, particularly the CLIP and the EMDP is part of RLDP design.

98. Project impacts, and therefore mitigation measures, cannot be confirmed in advance in full detail in a large infrastructure project. The schedule of impacts may be modified if the schedule of construction works changes. For example, impacts upstream of the reservoir, caused by tail waters backing up during floods, or downstream caused by changes to sedimentation patterns, cannot be forecast. An adaptive management approach will therefore be adopted for environmental and social management components. Safeguards will be proactively managed to reach fully the objective of meeting the requirements for management of: fish and fisheries in the reservoir and downstream; water releases and environmental flows; increased erosion downstream; water quality in the reservoir and downstream; health impacts; and resettlement and livelihood development. Adaptation will only take place if the outcome of this adaptation is conducive to better achievement of the project objectives and principles. Adaptive management cannot be used to justify actions that would conflict with legal principles or Bank policies.

99. All EMP and RLDP activities have been adequately budgeted. EMP implementation is included in the contractual commitments of the civil works contractors, and these are estimated to be about 8 percent of the main civil works contracts. Hence EMP costs from this source are about \$11 million, with a further \$2.3 million budgeted for other support and monitoring activities. The RLDP costs are estimated at \$40.5 million, which amount includes cost of land acquisition, compensation payments, livelihoods restoration and support for ethnic minorities.

### ***Dam safety***

100. Vietnamese dam safety requirements have been reviewed and compared with the requirements of OP 4.37. The most significant divergence in design practices is that TSHPP is (a) required to be designed to cope with a design flood frequency of 0.5 percent (that is the worst flood expected to occur in 200 years), which in Trung Son's case is estimated at 10,400 cubic meters per second ( $\text{m}^3/\text{sec}$ ), and a check flood frequency of 0.1 percent ( $13,400 \text{ m}^3/\text{sec}$ ) without being overtopped; (b) it does not require dam safety reviews by independent panels of experts throughout the whole project cycle from design, construction, filling of the reservoir to the start of operation; (c) although there are stipulations regarding operation and maintenance (O&M) and emergency preparedness, it does not specifically require preparation of a detailed O&M plan and an emergency preparedness plan at the design stage and before reservoir impounding; and (d) where failure of an upstream existing dam or a dam under construction could cause extensive damage to the new downstream structure, no assessment of dam safety or recommendations of improvements needed in the upstream dam are required.



101. EVN and TSHPMB have reviewed the dam's performance under extreme flood conditions which it has assumed to be the 72 hour probable maximum flood (PMF) at the dam site, which it has estimated at 31,100 m<sup>3</sup>/s. Under PMF conditions, overtopping of the dam as initially designed would have occurred, which could in turn have been expected to lead to dam failure. In consequence, TSHPMB reviewed several design options, and selected a fuse gate dam and emergency spillway as the most cost effective way of passing the PMF.

102. Dam Safety Review Panel. TSHPMB established a DSRP which has undertaken two missions at the feasibility stage and detailed design stage of the project. It has reviewed the quality assurance, O&M, instrumentation and emergency preparedness plans prepared by TSHPMB and found them satisfactory. The DSRP has accepted the proposal to adjust the design of the dam to allow safe passage of the PMF. All the other recommendations of the DSRP have been met and the DSRP has issued a letter providing its clearance of the plans. In consequence TSHPP now meets the requirements of OP 4.37 and international practice with respect to dam safety. The role of the DSRP will be absorbed by a Project Technical Advisory Panel (PTAP) which will, in addition to meeting the requirements of OP 4.37, be tasked to provide more general project technical and engineering advice. It is planned to continue to function until at least two years after first impoundment of the reservoir.

#### ***Projects on international waterways***

103. MoIT and EVN have consulted the government of the Lao People's Democratic Republic (Lao PDR) which has formally provided its no objection to the project. It is expected that EVN will continue to exchange views on the project and, within the context of the work on river basin management proposed to be financed under the project, it is expected that the dialogue will continue.

#### ***Other projects in project area***

104. All seven of the communes that constitute the core RLDP area are considered by the government to be difficult and remote. They are therefore included in a number of other programs targeting poverty reduction. These projects are not considered linked within the definition provided by OP 4.12, since they are not directly related to the Trung Son Hydropower Project, nor necessary for it to achieve its objectives.

105. More information about safeguards aspects of the project is in Annex 10.

### **G. Consultation, communications and community relations**

106. The principle of free, prior and informed consultation throughout the project area has been pursued during project preparation and will be continued during implementation. In practice this has meant provision of written, visual and audio materials in form, substance and language appropriate for the audiences well in advance of consultations. The consultations have been held at hamlet or village level, and led by respected members of the community. Minority or under-represented groups, including women and young people have had opportunities to express their opinions in all meetings. Communities will continue to have opportunities to voice concerns during project implementation.

107. Reports of consultations provided by TSHPMB indicate broad support for the project. This is supported by firsthand experience of the task team and Bank management through several field visits throughout the project area over the period from 2008 to date. In the most recent field visit, in October 2010, several communities expressed continuing support for the project, and

requested acceleration of project implementation. In the opinion of the task team, there is broad community support for the project.

108. To ensure effective communications with a large and diverse group of stakeholders, TSHPCo has put in place a comprehensive plan, aimed at maintaining understanding and ownership of the project. The plan is based on the primacy of EVN in communications, ensuring that information is accessible to all stakeholders in formats appropriate for the audiences, and that communication is candid and proactive. TSHPCo has established a web site ([www.trungsonhp.vn](http://www.trungsonhp.vn)) on which key project documents are disclosed. The Bank's web page for the project ([www.worldbank.org/vn/trungson](http://www.worldbank.org/vn/trungson)) links to this page and is an additional access point for stakeholders.

109. A community relations program is integrated into the safeguards team of TSHPMB. The purpose of the program is to address concerns and complaints from people and communities affected by the project, to maintain information flow, and to be the point of contact for the resolution of complaints and grievances. The program is budgeted and staffed and is integral to the safeguards unit of TSHPCo. Contractors, especially the main civil works contractor, will be required to support this program with staff and information.

110. In addition to the formal grievance process required under Vietnamese law, an independent grievance panel (IGP) has been established. It is designed to be accessible to the people affected by the project, by allowing approaches through many sources. All complaints will be reviewed by the IGP and where necessary it will hear complaints in face to face meetings, and publish its findings. The IGP will be composed of members of TSHPCo and will include at least one member of the PoE. Additional members may be co-opted if required and it may take independent advice at its discretion.

111. More detail about the consultation, communications and community relations aspects of the project is in Annex 11.

## **H. Governance and accountability**

112. The Bank is carrying out a review of EVN's governance and accountability systems following a request by EVN's senior management. As part of this, an assessment of the governance and accountability arrangements for the project has been carried out during preparation, in response to the general perception that there is a high risk of fraud and corruption in hydropower projects worldwide. There have been allegations of collusive and fraudulent actions during the procurement of access roads and bridges which have been referred to the relevant national authorities and EVN. EVN cancelled the bidding and reassigned several managers from TSHPMB. The complaints were reported to the Bank's Integrity Vice Presidency (INT).

113. EVN has a long history of successful implementation of Bank projects with few instances of fraud or corruption. Following the initial allegation of collusion in bidding for the access roads and bridges, senior EVN management and TSHPMB signaled their intention to improve governance and accountability while also recognizing that TSHPMB was a young organization which needs additional support at the corporate level. Two main strategies have been adopted. One is to strengthen TSHPCo, for which a Governance and Accountability Framework (GAF) has been developed, together with a time bound action plan and staff needs have been agreed. This identifies five areas for reduction of risk as follows:

- (a) Enhancing integrity by raising awareness;
- (b) Strengthening of accountability for package integrity;
- (c) Strengthening of project controls to increase accountability;
- (d) Enhancing transparency in project procurement and implementation;
- (e) Improving capture of complaints to increase accountability;
- (f) Broadening stakeholder involvement to increase accountability.

114. Individual actions outlined above have been prioritized and a timetable for their completion has been set. Awareness raising, enhancing transparency in procurement and improving capture of complaints are agreed to be of the highest priority. TSHPCo will be committed by project covenant to implement the GAF in its entirety, and the steps for this will be included in the POM. In keeping with the general principles for adaptive management, adjustments may be made in the light of experience and through discovery of what works and what does not. A second strategy is to strengthen the inspection process in EVN. This is a longer term effort, and the lessons learned in TSHPCo will be used as the basis for a broader effort to improve inspection and other activities that can then be transferred to EVN as a whole.

115. The GAF is discussed in more detail in Annex 12.

## **I. Policy Exceptions and Readiness**

116. No policy exceptions are required for the project.

117. The required sequencing of the main parts of the project requires an early start on access road and bridge improvement. Resettlement compensation is now substantially complete and the road alignment has been cleared. Procurement of the road and bridge construction has started with bids issued and contracts expected to be awarded and construction start by June 2011. Selection of the supervising consultant is now nearly complete. Independent monitoring consultants for the social and environment aspects of the access roads are also being selected.

118. Selection of the main supervising engineer, which will support procurement of the main works and goods contracts has started, as has prequalification of the main works contractors. The consultants will be expected to start work in mid to late 2011 followed by main works construction startup in June 2012 and implementation of resettlement, livelihoods restoration and environment management. Project milestones are set out in Annex 6 and are currently on schedule.

119. TSHPCo's transition from planning to implementation is now under way. It is recruiting staff, to increase its capacity for procurement and for project supervision. Several staff from the resettlement unit have moved to the project area. A program to define better its staff responsibilities and to train them for implementation (including for Bank-related fiduciary aspects) was finalized at appraisal and started before negotiations.

## Annex 1: Country and Sector Background

### VIETNAM: VN-Trung Son Hydropower Project

#### SECTOR BACKGROUND

##### Introduction to Vietnam's Electric Power Sector

1. Vietnam's electric power system caters to the country's resource endowment and geographic configuration. With water resources available in all three of the country's main regions, hydroelectric power was the dominant source of power generation from the late 1980s until recently. Thermal generation from coal adds base load capacity in the north. Thermal generation from offshore natural gas has been developed in the south since the late 1990s, adding to small amounts of oil-fired thermal capacity. Total available capacity on the system by the end of 2010 was 19.74 GW (see Table A1.1). Of this oil and gas (mainly natural gas in combined cycle gas turbine units) accounted for 7.49 GW giving a share of 37.9 percent, hydro for 7.91 GW or 40.1 percent, and coal 3.01 GW or 15.3 percent.

**Table A1.1: Vietnam's Power Generating Capacity  
(MW available at end of year) 2004 – 2010**

	2004	2005	2006	2007	2008	2009	2010
<b>EVN-owned:</b>							
<b>Hydro</b>	4,121	4,155	4,583	4,393	5,257	6,143	7,420
<b>Coal</b>	1,205	1,245	1,245	1,545	1,545	1,485	2,285
<b>Oil and gas</b>	3,161	3,137	3,590	3,448	3,563	3,461	3,461
<b>Other<sup>1</sup></b>				454	454	300	300
<b>Total EVN</b>	8,487	8,537	9,418	9,840	10,819	11,389	13,466
<b>Owned by others:</b>							
<b>Hydro</b>	-	298	326	n/a	241	413	493
<b>Coal</b>	155	138	370	n/a	225	411	725
<b>Oil and gas</b>	1,305	1,914	1,936	n/a	4,005	3,804	4,027
<b>Other<sup>2</sup></b>	42	168	307	n/a	574	796	1,024
<b>Total owned by others</b>	1,502	2,518	2,939	3,668	5,045	5,424	6,269
<b>Total</b>	9,989	11,055	12,357	13,508	15,864	16,813	19,735

Notes: 1 Small hydro, diesel.

2 Includes biogas cogeneration, small hydro, purchases from other countries.

2. A 500 kilovolt (kV) backbone transmission line connects the regions and generation sources, assisting the optimal use of resources during different seasons and as the generation mix and demand evolve. EVN has completed a second north-south 500 kV line, strengthening power transfer capabilities. With additional 500 kV lines for power evacuation from new major generation complexes and work well advanced on rings around Hanoi and Ho Chi Minh City, the total 500 kV network extended to about 3,890 km in 2010. In that year, 220 kV lines amounted to over 10,000 km and 110 kV lines totaled over 13,100 km. Interconnections with neighboring China, Cambodia and Laos at 110kV and 220kV are now complete, and under consideration at 500kV.

3. Adequate and sustainable investment in the power sector is necessary to support economic growth and poverty reduction in Vietnam. Vietnam has faced high levels of demand growth for the past decade, only falling to 10 percent in 2008 due to the global crisis before returning again to nearly 14 percent, close to the trend rate of 15 percent, in 2009. 2010 saw growth of 14.5 percent and it was also a dry year, further straining the thermal capacity of the

system. Reserve margins have eroded to the point where power shortages leading to load shedding have been an intermittent problem since 2005, especially in dry years.

**Table A1.2: Vietnam's Electricity Production and Sales 2004 – 2010**

	2004	2005	2006	2007	2008	2009	2010
<b>Total production (TWh)</b>	46.2	52.1	59.0	66.8	76.0	87.0	100.1
<b>Total sales (TWh)</b>	39.7	44.9	51.3	58.4	65.9	74.8	85.6
<b>Own use, transmission and distribution loss ( TWh)</b>	6.5	7.2	7.7	8.4	10.2	12.2	14.5
<b>Own use, transmission and distribution loss ( percent)</b>	14.1	13.8	13.1	12.6	13.4	14.0	14.5

4. Electricity use in Vietnam is growing from a very low base. In 1995, total power sales of 11.2 TWh amounted to only 156 kWh per person per year. Even after growth in electricity use to 85.6 TWh – about seven times – by 2010, total end-use consumption amounted to only 983 kWh per capita per year, compared with an average of 1,883 kWh<sup>2</sup> per capita per year in East Asia and Pacific and 1,666 kWh<sup>3</sup> per capita per year in low and middle income countries worldwide.

5. Industrial electricity use has now overtaken residential consumption, and accounts for nearly 50 percent of the total (see Table A1.3). Although the service sector has played a role, industry and household use have been primarily responsible for the growth in demand, and this trend is expected to continue.

**Table A1.3: Vietnam's Electricity Consumption by End User 2000 – 2010, TWh**

	2000	2004	2006	2008	2010
<b>Industry and construction</b>	9.1	17.9	24.3	33.0	44.4
<b>Agriculture</b>	0.4	0.6	0.6	0.7	0.9
<b>Residences</b>	11.0	17.7	22.0	26.7	32.0
<b>Commerce and Other</b>	1.9	3.5	4.4	5.6	8.2

6. Industry and construction, which is relatively electricity-intensive, increased its share of GDP from 22.6 percent in 1995 to 42 percent in 2007, falling back to 32.5 percent in 2009 but climbing back to 41.1 percent in 2010. Industrial output grew by 15-17 percent per year during 2000-2007 but reduced to eight percent in 2009 before starting to climb again, achieving an estimated 14 percent in 2010. The types of light industry that have grown fastest in Vietnam—food and beverage processing, textiles, light chemicals, and light consumer durable goods—often tend to increase power use per unit value added as development proceeds, due to increasing automation, packaging and (for food, beverages and textiles) increased use of cooling. Industrial electricity demand growth has increased especially fast during the last few years (17 percent p.a. between 2000 and 2008, though coming down to 12 percent in 2008 - 2010), and is expected to continue to be a key demand driver.

7. With both increases in the urban population and the success in rural electrification, about 8 million new households were added as power users from 1996 to 2008, representing some 55 percent of Vietnam's population today. Probably even more influential on demand growth, however, given the low consumption levels of new rural household customers, has been growth in household appliance ownership, as disposable incomes have grown from very low levels in the mid-1990s. Even so, the current average consumption of about 32 kWh per person per

<sup>2</sup> 2007 data. Source World Development Indicators Database

month among residential electricity users is low, and certain to increase, as power use grows from nascent levels in the countryside and as heavy appliance use, especially use of air conditioners, begins to take hold among middle-income groups.

#### Policy and Institutional Framework

8. Ministry of Industry and Trade (MoIT) is the ministry mainly responsible for the power sector. Besides MoIT and the Government Office (of the Prime Minister), other government agencies with a role in the power sector include:

- The Ministry of Planning and Investment (MPI), which is responsible for the preparation of the country's overall economic development plans, and review and provision of recommendations to the Prime Minister for all projects using public funds or other resources;
- The Ministry of Finance (MoF), which, in addition to its broad role overseeing financial matters for the government and the budget, arranges government guarantees for export credits, and provides, through its Vietnam Development Bank (VDB), public sector loans to qualified users;
- The Ministry of Natural Resources and Environment (MoNRE), which is responsible for environmental regulation;
- The State Bank of Vietnam (SBV), which is responsible for allocation of foreign exchange, and, as such, is the counterpart for international donor lending; and
- Provincial Peoples' Committees (PPCs), which have responsibility for local affairs, including all functions delegated by the central ministries. One of the PPCs' most important roles is in the implementation of laws and regulations related to the transfer and use of land.

9. Legislation on the electricity sector includes the Electricity Law (2004), followed by Decrees 105 and 106 (2005), which have to do with implementation of the Electricity Law. The Prime Minister's Decision 258 of 2005 established the Electricity Regulatory Authority of Vietnam (ERAV). The Prime Minister's Decision 26 of January 2006 set out the roadmap for reform of the power sector and Decision 1855 of December 2007 set out the national strategy for energy development to 2020. Other legislation includes Decree 55 (2003) and Decree 189 (2007), establishing the functions, tasks, powers and organizational structure of MoIT. Decisions of the Prime Minister and of MoIT have also set in place a substantive program of reform of the power sector.

#### Power Sector Structure and Ownership

10. In line with Vietnam's socialist market economy, public ownership dominates the energy sector but, increasingly, market forces are being brought to bear and private sector participation is expanding. From 1995–2006, power sector operations were organized under Electricity of Vietnam, a General Company operating under Decree 91 of 1995 which created a number of large state owned enterprises. In 2006, Vietnam Electricity Group (EVN) was created, into which the assets of Electricity of Vietnam were placed, under a holding company structure.

11. EVN owns and operates the majority of existing state-owned power plants. Many of EVN's power plants have been equitized, meaning that the assets have been placed into a Joint Stock Company (JSC) and shares offered for sale to the public and to EVN employees. EVN

has, to date, retained a majority shareholding in all equitized power plants. EVN's ownership currently extends to about two-thirds of installed and operating capacity.

12. Transmission of electricity at 500kV and 220kV is the responsibility of the National Power Transmission Corporation (NPT) which was formed on July 1, 2008. Currently an independent accounting unit and a wholly owned subsidiary of EVN, it is the transmission network operator and is also responsible for management of all investment projects in the transmission segment.

13. Five subsidiary Power Corporations (PCs) are in charge of power distribution from 110 kV downwards. They were created in early 2010 out of the original 11 Power Companies. Northern Power Corporation merged Power Company 1, covering most of northern Vietnam, and three city or provincial level independent Power Companies, covering Hai Phong, Hai Duong and Ninh Binh. Central Power Corporation merged Power Company 3, and the power companies responsible for Da Nang city and Khanh Hoa province. Southern Power Corporation merged Power Company 2 and Dong Nai Power Company. Hanoi Power Corporation took over the operations of Hanoi Power Company and Ho Chi Minh City Power Corporation took over the operations of Ho Chi Minh City Power Company. The PCs each maintain their own financial accounts, although these are also consolidated into EVN's. Historically the PCs have had little financial autonomy but this is gradually changing. Other key entities under the EVN umbrella include four Power Engineering Consulting Companies, the National Load Dispatch Center, a number of equipment manufacturing companies, a telecoms subsidiary and a bank.

14. State policy has increasingly encouraged development of independent power generation by investors other than EVN. Whereas non-EVN owned capacity totaled some 620 MW in 2002, accounting for just 7 percent of installed capacity connected to the system, it amounted to nearly 6,300 MW in 2010 taking total non-EVN owned capacity available to the grid to 32 percent of the national total. In Vietnam, independent power projects (IPPs) refer to locally-owned and locally-financed plant with power purchase agreements with terms as short as two or three years. Several Vietnamese SOEs are active in this market, notably Petrovietnam, the oil and gas company, Vinacomin, the mineral mining company and some large construction firms. Petrovietnam is the second largest generator in the country now, with about 2,100MW or about 11 percent of total installed capacity in 2009.

15. Internationally-owned and -invested power plants are generically known as build operate transfer (BOT) projects. They may be wholly owned by foreign, private firms or in various joint-venture arrangements. Two gas-fired units at Phu My (Phu My 2.2 and Phu My 3) are the first examples of the BOT structure in Vietnam. Several more are under development including coal fired units at Mong Duong 2, Vinh Tan 3 and Nghi Son 2 which is being competitively bid. MoIT is responsible for executing bidding and contracting procedures for BOTs.

16. About half of the low voltage (LV) retail distribution system in rural Vietnam is owned by local distribution utilities (LDUs). These are the product of the major effort in rural electrification and the need to share costs between the central budget and provinces, communes and electricity consumers, mandated by Decree 22 of 1999. As a result of the decree, LDUs were formed to connect consumers to an LV system, and in turn, connect the LV system to the PCs' medium voltage (MV) system. Until 2004, local power distribution was handled by Commune Electricity Groups or other informal entities. According to government regulations, however, all of these entities were required to convert to formal legal persons, such as

cooperatives or joint-stock companies in 2005. The recent decree introducing a uniform national tariff for all power distributors, accompanied by a requirement for LDUs to remain financially viable has meant that an increasing number of LDUs are handing their assets to the PCs. It is expected that about 25 percent of rural consumers will continue to be served by LDUs over the medium term, with the remainder receiving supply from PCs.

### The Power Sector Reform Program

17. The reform program entails a major transformation of the power market, sector structure, trading and purchase agreements, generation pricing and regulation of network services and retail tariffs in Vietnam. The design of the power market and the restructuring is intended to change how projects are financed, the interest and participation of the private sector (both local and foreign investors), how costs of supply are determined and how they are reflected in tariffs. The goal is to introduce incentives and regulations to bring about improvements in quality of service, the efficiency with which energy is used, and to enable existing and new investors to finance sufficient generation to achieve adequate levels of electricity generation capacity for security of supply.

18. The Electricity Law establishes a new framework for the power sector, comprising:

- The gradual development of a competitive power market, starting with a market in which multiple generators compete to generate and sell to a single wholesaler (the Single Buyer), moving later to a wholesale market with multiple buyers – power companies and large consumers – and sellers – power generators – and, in time the development of retail competition enabling consumers to choose their supplier;
- A planning process to select new generation investment to supply projected demand consistent with security and reliability criteria and government energy policies that will gradually evolve from the current centralized master planning process. The first step is to transfer oversight from EVN to MoIT. In later stages of reform, master planning is expected to give way to indicative planning, based on market information, leaving greater discretion to project proponents in choice of project location, technology and timing; and
- The establishment of ERAV, under the supervision of the Minister of Industry and Trade, as the economic regulator of the sector.

19. Prime Minister's Decision 26 of 2006 approved a Roadmap for the development of the competitive power market within the general framework defined in the Law. The Decision envisages a three phase process, with each phase split into two stages: an initial pilot to test and improve the design and then a stage for full implementation. It also sets pre-conditions to be met for moving from one phase to the next and requirements to restructure the actors in the power sector to match the needs of the market. In more detail the phases and indicative timetable are:

- *Phase 1 (2005 - 2014)*: The transitional phase during which preparation, detailed design, and trials lead to the creation of the Vietnam Competitive Generation Market (VCGM). The VCGM will introduce competition among generators to enter the market based on allocation of concessions to develop power plants identified in the master plan. It will also introduce competition to be dispatched (that is, to supply electricity into the network). The full implementation stage will require all power plants to be contracted to sell a set quantity of electricity, initially 90-95 percent of that generated, but declining over time at a set price each year to a single wholesale licensee (the Single Buyer), which



will resell to PCs at regulated bulk supply tariffs. A centrally administered spot market will manage competition for generation scheduling, dispatch and ancillary services;

- *Phase 2 (2015 - 2022)*: Wholesale Competitive Market (WCM), in which generators will be able to sell directly to wholesalers, the PCs or qualified large customers. In the pilot stage, selected PCs and large customers will be allowed to contract directly with generators and trade in the spot market. In the completion stage, all PCs and large customers will enter and participate in the wholesale market and multiple wholesale licensees will be allowed; and
- *Phase 3 (from 2023)*: Retail Competitive Market (RCM), in which the PCs' monopoly as retailers to small and medium sized customers will be phased out. In the pilot stage, customers in designated provinces and above a specified threshold most likely based on annual consumption or peak demand will be allowed to contract with their chosen supplier. During the full implementation stage, the number of provinces will be gradually extended and thresholds gradually reduced.

#### KEY ISSUES IN THE POWER SECTOR

20. The key challenge for the energy sector in Vietnam is to manage demand growth and reform simultaneously. Vietnam's continuing economic development, urbanization and industrialization have created increasing demand for electricity in general, and peaking supply in particular. These conditions cannot be accommodated by efficiency improvements alone. With one or two exceptions, the efficiency of Vietnam's thermal plant is good, and the older ones will either be rehabilitated or retired by 2015. Transmission and distribution losses are already quite low, and the present strategy already includes significant expenditures to bring this down from around 11% to 9%. EVN has embarked on an ambitious DSM program including a quite successful compact fluorescent lamp distribution program, and important initiatives to improve commercial energy efficiency. Vietnam has little option but to combine efforts to improve the efficiency with which it uses energy with an ambitious expansion plan.

**Table A1.4: Vietnam's Power Sector Demand Growth 2006 – 2020**

	2006 Actual	2010	2015	2020	Growth rate 2006–2010, % pa
<b>Institute of Energy</b>					
Energy requirement (TWh)	59	113	190	294	16
Peak load (MW)	11,000	19,117	31,495	n/a	12
Capacity requirement (MW)	12,357	24,919	40,700	60,300	15
<b>World Bank</b>					
Energy requirement (TWh)	59	91	156	240	11
Peak load (MW)	11,000	15,380	25,768	39,000	8
Capacity requirement (MW)	12,357	19,230	32,210	48,750	8

Source: Institute of Energy revised load forecast 2009; World Bank Future Power Generation Study

21. In May – July 2005, there were shortages of about 10 percent of installed capacity. While the shortages were avoided in 2006 due to new capacity coming on line, early and heavy rains and short term energy saving measures, they reappeared in June 2007 and have been persistent and less seasonal since then. A critical problem is to build up sufficient reserve margins to avoid load shedding when having to cope with scheduled and unscheduled outages. Capacity shortages in 2009 limited peak demand to about 13,800MW, leaving operational reserve at zero and system reserve well below 25%, a widely accepted norm in the industry to

achieve security of supply and end periodic shortages. Vietnam is estimated to have faced a shortfall of up to 1,200MW of capacity in 2010. Table A1.4 sets out two forecasts for demand growth between now and 2020, one from Vietnam's Institute of Energy, and one carried out by the Bank as part of preparation of Trung Son. Neither one is necessarily superior to the other, but serve to illustrate the uncertainty planners face especially when demand growth is high.

22. Given current plans, emissions from power generation are projected to rise from an estimated 30 million tonnes of CO<sub>2</sub> per year (MtCO<sub>2</sub>e/year) in 2009, nearly evenly divided between coal-fired and gas-fired generation, to a little over 200 MtCO<sub>2</sub>e/year in 2025. This implies that emissions from power generation will represent some 40 percent of the estimated 508 MtCO<sub>2</sub>e/year in 2025 under a business-as-usual scenario. And emissions from coal-fired generation would constitute nearly 90 percent of all emissions from power generation in 2025—the rest coming from gas-fired generation.

23. Emissions from power generation are expected to dominate emissions from energy use (nearly 90 percent of all gas is used for power generation and an increasing proportion of coal is to be used for the same purpose). Reduced electricity consumption will mean reduced thermal (particularly coal-fired) generation in Vietnam. The priorities for emissions mitigation efforts in Vietnam's energy sector must be (i) reduction in coal-fired generation and (ii) economic pricing of energy sources, and (iii) maximum use of best-in-class energy efficient technologies to minimize energy use in achieving the planned economic development outcomes.

24. Vietnam's options for power generation are a hydropower potential of 25,560 MW, sizable resources of coal and gas, new/renewable potential of possibly over 13,000 MW as well as some nuclear power. Among the choices of power generation sources available to Vietnam, every source that displaces coal from the generation mix would reduce emissions. Anthracite coal combustion typically produces 98.3 tons of CO<sub>2</sub> per terajoule of energy consumed (tCO<sub>2</sub>/TJ) compared to 56.1 tCO<sub>2</sub>/TJ from natural gas combustion, based on IPCC default values (IPCC, 2006). But the choice of generation fuel is complicated by cost considerations. The reforms will establish a competitive generation market and coal is among the least-cost power generation options for base-load in Vietnam. Coal-fired generation will not be easy to displace from the generation mix without the incorporation of environmental costs into coal pricing.

25. Vietnam's power generation mix has been shifting from a dominance of hydropower a decade ago (nearly 60 percent of total electricity generated) to a dominance of thermal generation, increasingly using coal and gas. In 2009, total electricity generated by hydropower had fallen to 39 percent with gas 37 percent, coal 21 percent, and 3 percent from other sources. Under current plans, coal-fired generation is to increase to 42 percent by 2015 and 64 percent by 2025 (with generation based on imported coal commencing in 2017 and contributing 23 percent of all power generation by 2025). In 2025, hydropower is expected to contribute only 22 percent of total electricity generated and gas only 12 percent under current plans with renewable sources contributing 1-2 percent with the rest from other sources including nuclear.

26. Large-scale development of coal-fired power generation is envisaged in Vietnam, but most of Vietnam's coal-fired power plants are yet to be built. Therefore, a decisive impact on emissions can be made through the choice of generation technology and the extent to which other energy sources can compete with coal to become part of the power generation fuel mix. The priorities of emission reduction efforts in power generation must be reducing emissions from

coal-fired generation and displacing coal from the electricity generation mix to the extent possible.

#### Optimizing Investments: Power System Expansion Planning

27. On the planning side, the basic institutional arrangements, analytical capacity and analytical tools being used are fundamentally sound. System expansion planning using the least cost principle is carried out every five years, in step with the five-year economic planning process for the whole country. The most recent Socio-economic Development Plan (SEDP) covers the period 2006 – 2010. As input to the SEDP, MoIT is responsible for preparing a Power Master Development Plan (PMDP). PMDP6, which covers the period 2006 – 2015 with a view to 2025 was approved by the Prime Minister in July 2007. PMDP7 covering the period 2011 – 2020 with a view to 2030 is now under preparation.

28. Although the PMDP is based on least cost planning principles, it serves a dual function. One is the more conventional forecast of investments required to meet demand. The other is as a preliminary approval process for those investments; projects must appear in the Master Plan to obtain the necessary investment approvals from the government. This clearly has implications for investment selection, and in addition the PMDP assigns several projects to particular entities for investment.

29. The long term hydrothermal planning process in Vietnam is divided into two parts. The National Hydropower Plan carried out an assessment of hydro projects on a river basin approach, using an integrated assessment based on the technical and economic viability, including multipurpose aspects, and environmental and social aspects. In the second stage, a National Hydropower Master Plan ranks hydropower projects. Those still not under construction are considered candidate plants for the power development master plan to identify their sequential development to meet the projected power demand growth and within system security and reliability constraints, with updated calculations of economical and technical indicators, and studies carried out by the construction companies. Hydrological characteristics of the candidate hydro projects are represented as scenarios/probability of energy and peak production. In practice, a number of different software programs for system expansion planning are used, covering both generation and transmission.

30. In its review of the PMDP6, while it was being prepared, the Bank recommended: (i) a strengthening of the economic and sensitivity analysis in the planning exercise, especially relating to assessment of the balance between coal-fired and gas-fired thermal power generation; and (ii) increased explicit attention to demand-side management (DSM) investments and benefits. In addition it would also become necessary to explore more sophisticated modeling options appropriate for hydropower projects and the options for increasing the availability of renewable sources of generation, particularly small hydro.

31. A basic transmission backbone for Vietnam's system is now in place. Further transmission expansion will be needed over the longer term to take into account movements of much larger quantities of power between north and south and links with other countries for imports of power. On the distribution side, steady investment is required to expand and upgrade systems to meet increasing load and minimize losses by replacing outdated, inefficient and overloaded substation equipment, lines and transformers. Losses in outdated and overloaded rural systems are often over 20 percent.

32. Improving the sustainability of investments and the sector as a whole is an emerging priority. Vietnam's rapid demand growth and efforts to meet it will have increasingly significant and disruptive social and environmental impacts. As it becomes a net energy importer, it will also experience decreasing energy security. Cost and pricing of peak power is also an issue as is, increasingly, the need for more integrated development of the transmission and distribution system. Sound planning, based on credible forecasting of demand and ensuring optimum project selection and then on-time completion remain critical.

#### Financing The Investments That Must Be Made

33. Total power sector investment requirements to meet demand approached US\$4 billion per year during the latter half of this decade. This is equivalent to about 14 percent of total national investment. Between 2011 and 2015 the amount will rise to over US\$4 billion per year (see Table A1.5).

**Table A1.5: Vietnam's Power Sector Investment Needs 2006 – 2020**

	Investment Requirements <sup>1</sup> in US\$ million		
	2006 – 2010	2011 – 2015	2015 – 2020
<b>Generation</b>	13,810	14,832	14,900
<b>Transmission</b>	2,668	2,723	2,972
<b>Distribution and other</b>	3,456	4,749	4,535

<sup>1</sup> Not including interest during construction.

Source: PMDP6, World Bank Estimates

34. Plainly EVN cannot meet this level of investment from its own resources. In addition, the government is both unable and unwilling to finance EVN. Current expectations are that about 60 percent of investment will be undertaken by EVN or its successor companies – or about US\$2.3 billion per year. Of this, no more than about 25 percent will be available from retained earnings, while the balance must be raised from external sources, principally debt. To date debt finance has been raised either from ODA sources, bond issues in the local markets or local banks.

35. ODA will continue to play a substantial and possibly growing role, with three major institutions lending to Vietnam's power sector, Asian Development Bank (ADB), Japan International Cooperation Agency (JICA) and the World Bank. Total ODA commitments to the power sector are estimated at \$1 billion to \$1.5 billion per year. EVN is contemplating an international bond issue of \$1 billion but no firm date has been set. In any event, debt is debt, however raised, and is limited by the strength of the balance sheet which supports it and constrained by the capacity and willingness of others to lend.

36. The remaining 40 percent of financing is expected to come from other SOEs, and private investors, both domestic and international. Those already involved — Petrovietnam and Vinacomin and some of the larger construction companies perhaps in joint ventures – are the most likely domestic candidates. The key, however, to long-term and sustained investment be to attract international investors. Following the successful closing of the Phu My BOTs, the government expressed its intention to reduce or eliminate its guarantee, which, combined with other more attractive opportunities in the region, resulted in a stalling of the program. Although there are now several BOT projects in the pipeline, it is clear that investors will seek further

clarity on the shape of the market in the future and a stronger legal and regulatory environment. Delays in closing private sector deals are inevitable and further credit enhancement is likely to be needed.

### Implementing Reforms in the Power Sector

37. The reforms present a significant opportunity for the government, and it has demonstrated strong ownership in the past year. It is implementing the first phase of the reform program through appropriate legal instruments and its steady and cautious approach has resulted in progress in each of the three major areas where reform is taking place. To date, the government has mandated the design principles for most aspects for the implementation of the VCGM standards and procedures. It has substantially reformed tariffs. The process of restructuring the sector so that the market can operate fairly and transparently and conflicts of interest are eliminated is under way, including the principle of creating independent generation companies, the Gencos.

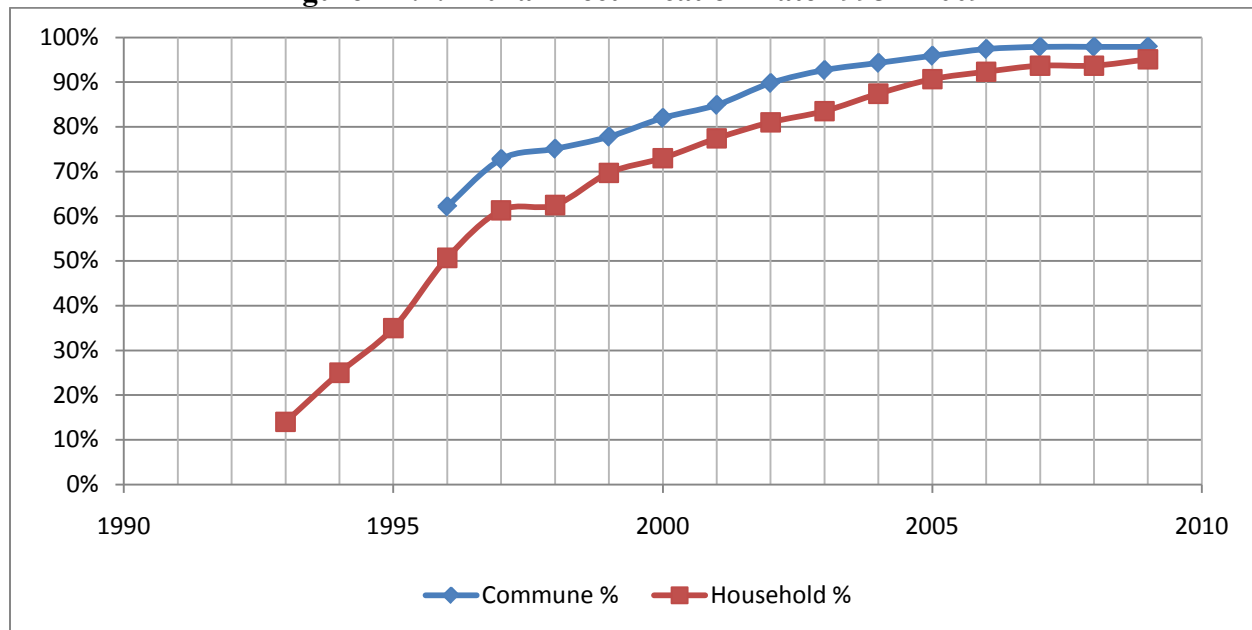
38. Notwithstanding this solid start, there remain challenges in the coming months, as the legislative and regulatory process continues. Two points are worthy of special emphasis:

- (a) *EVN will need to be broken up into truly separate corporations.* The existing model of EVN as the holding company for all or even the bulk of the state's assets in the power sector cannot be retained if true competition is to be achieved among existing and new generators, and later, in wholesale and retail supply. The market requires independence among players, to avoid actual or perceived conflicts of interest or potential collusion.
- (b) *Current and prospective power shortages provide additional challenges for reform.* Introduction of competition during times of shortage will tend to drive up prices, which may necessitate specific measures to minimize excessive rent-seeking behavior. Other types of problem may arise if assets which are uneconomic over the long term are developed under state ownership since headaches will arise as these new assets will have trouble competing in the market.

### Improving Access and Service Quality

39. Access to electricity in rural areas has increased dramatically since 1996, marking one of the most successful recent rural electrification programs in the world. The proportion of rural households with access to electricity has increased from 50.7 percent in 1996 to 96.1 percent in 2009 (Figure A1.1). Rural household access rates are expected to increase further during the next several years, although providing access to the final five percent of rural households will not be easy. The success of Vietnam's program lies especially with the commitment of the government to rural electrification, and the definition and systematic implementation of national plans as a matter of priority, with public investment support to match local community funds.

**Figure A1.1: Rural Electrification Rate 1993 – 2009**



Source: EVN

40. Widespread anecdotal evidence points to substantial increases in the quality of electricity service over the last ten years, with service for most customers in urban or peri-urban areas becoming noticeably more reliable. However, there is a basic lack of systematic statistical monitoring of service interruptions and voltage drops, by service area and customer voltage level. This shortcoming needs to be rectified, to develop benchmarks, comparative performance indices between service areas and categories, and monitorable programs for improvement.

41. Further improvement is needed. Investment climate surveys for Vietnam frequently cite shortages and quality as an important issue and rate poor power service as a significant infrastructure constraint. The World Bank Group's most recent Doing Business survey in 2009 found that there had been some improvement in recent years: electricity as a constraint on a firm investing in Vietnam is rated seventh most severe, down from one of the top four in the previous survey in 2006. Vietnam is below the regional average in terms of duration of outages and value lost as a result, while it takes longer to obtain a new connection. This points to a need for a major and systematic effort to monitor service quality properly, and for improvement in service provision.

42. As a natural monopoly, improvements in power distribution service quality cannot be achieved through competition. A combination of regulatory pressure and additional outside expertise offers solutions. PCs will have more incentive to improve performance as service quality is a factor in the tariff methodology, overseen by ERAV, the regulator. Hence future earnings will be affected by current performance. Outside expertise can be obtained through equitization to bring in strategic investors: companies with expertise from other countries and the ability to introduce new management techniques and disciplines may be willing to invest. This will, however, involve marked changes to the equitization strategy pursued so far, since strategic investors will want to be sure they can achieve strong earnings growth to justify their investment; hence sufficient ability to affect management decisions that stems from a significant shareholding will be a prerequisite.

## Pricing and Tariffs

43. Electricity tariffs that are reflective of efficient costs in the electricity supply chain provide predictability for sustainable investment in the power sector, to finance much needed new generation capacity, transmission upgrading and distribution improvements. A key target of the sector reforms is to build investors' perception that tariffs in the power sector will be sufficient to cover generation, transmission, distribution and system operation costs. Tariff methodologies and regulations must ensure that electricity market participants know that regulated tariffs will allow them to recover costs over the lifetime of their investment. Cost reflective tariffs need to be accompanied with subsidy mechanisms ensuring protection for the poor, especially for rural areas in Vietnam.

44. The reforms have to address two issues. First, the level of tariffs must be maintained at a realistic level. Tariffs have shown good progression in recent years: from Vietnamese Dong (VND) 873/kWh in 2008 to VND 948.5/kWh in 2009, VND 1,058/kWh in 2010 and VND 1,242/kWh in 2011, giving an annual average rise in the past three years of 13.6 percent. Yet in US dollar terms, tariffs have remained within a frustratingly narrow band of around 5.5-6.0 US cents/kWh for the past decade. Second, tariff setting must continue its move away from the old system under which increases have been promulgated by decision of the Prime Minister, following a protracted and untransparent process of negotiation between EVN and the government and then within the government itself. The system must be replaced with one that reflects actual agreed costs, to the greatest extent possible assisted by market mechanisms that support price discovery, to provide predictability for investors.

45. Cross subsidies, estimated at \$370 million in 2007, from industrial and commercial to residential consumers are to be gradually eliminated, and targeting of subsidies to the poor improved initially with changes in the structure of the residential block tariff. A first and significant step has been taken in putting all households on an equal footing, by extending the existing uniform tariff policy for PCs to all the country by including the tariffs of rural local distribution utilities (LDUs). Reforms are also focused on ensuring that as much of the subsidy as possible reaches the poor. In the longer term, introduction of greater generation competition and consumer choice through retail competition will reduce the needs for tariff regulation and government involvement in price setting. Such a change would require complementary mechanisms to ensure continued protection for the poor which, ultimately, may be delivered through other targeted social programs rather than through the current tariff schedule for households.

46. The Electricity Law assigns responsibility for tariff decisions to the Prime Minister. The Prime Minister's Decision on electricity pricing in December 2006 (276/2006/QD-TTg) formalized the transformation to market based cost reflective tariffs with the statement that: *"From 2010, the electricity retail price shall be based on the market price"*. More recently, the Prime Minister's Decision 21/2009 set out the principles to unbundle tariff setting into separate generation (power purchase) costs, regulated transmission and distribution network services revenue requirements, regulated system and market operation costs, and other costs.

47. Although tariff decisions should ideally be insulated from considerations other than strictly economic and financial, the setting of tariffs will continue to require government approval. Reforms will provide significant improvements in the transparency and promptness with which tariff decisions are made. Resetting will be on a regular annual cycle with changes

scheduled for March of each year, based on cost and demand data and objective assessment of their reasonableness by ERAV. The Prime Minister has delegated to the Minister of Industry and Trade the approval of average tariff updates if the proposed average retail tariff change is below five percent. Further changes to the arrangements are now under consideration which will allow quarterly adjustment of the tariffs that generators may charge in the VCGM to account for fuel price fluctuations. These adjustments will be passed on to electricity consumers. Some relaxation of the five percent rule is also being contemplated. Further changes will be introduced as a result of experience with VCGM. Nonetheless, the government still retains control, with tariffs being calculated by ERAV and submitted to MoIT for approval. Although backtracking is unlikely it does present a risk for all power generation projects and ensuring delivery of real tariff increases is vital for the financial health of the sector.

48. EVN's balance sheet is increasingly stretched, and in 2008 financial performance slipped, recovering somewhat in 2009. NPT has also faced similar challenges, although the PCs have historically performed better. A more detailed discussion on EVN's financial performance is in Annex 9. Notwithstanding some specific challenges faced by EVN and its subsidiaries, including significant foreign exchange liabilities which have translated into large, though unrealized losses, it is clear that continuing increases in tariffs are unavoidable if EVN — and of equal importance, its successor companies — are to retain sufficient earnings to finance a reasonable proportion of their investments and to leverage further financing. Moreover, Vietnam's ability to attract foreign direct investment into generation within a reformed market is also critically dependent on a tariff regime that is seen by investors to be fair, transparent, predictable and able to offer reasonable rates of return over the lifetime of a project.

#### HYDROPOWER

49. Vietnam has a high hydropower potential with 2,360 rivers and streams with a length of more than 10 km, the Mekong and Red River being the largest ones<sup>3</sup>. Consequently, hydropower has historically been a mainstay of Vietnam's power sector development program. It has been estimated that the economically viable hydropower potential in Vietnam is 205560 MW and 83.4 TWh/year<sup>4</sup>.

50. The entry of Hoa Binh (1,920 MW) into service in 1989 marked the start of the creation of a unified power system across the whole of Vietnam, and the remarkable extension of service that followed, thus making a significant contribution to Vietnam's development. By 2004, hydro capacity stood at 4,227 MW, with Hoa Binh and Yali (720 MW) accounting for 60% of the total. By the end of 2010, hydropower contributed 7,900 MW out of a total of just over 19,700 MW available, and supplied 27.6 TWh of the total of 100.1 TWh of electricity produced.

51. As part of the least-cost power generation development strategy, Vietnam will seek to maintain the share of hydro in the generation mix especially for peaking and mid-load purposes, where the alternative would be gas-fired thermal generation. The remaining hydropower resource yet to be developed offers several advantages including:

- It is a domestic source of energy. While this is also true of gas, which makes up a significant proportion of all electricity generated in Vietnam, and coal which is planned

<sup>3</sup> National Hydropower Master Plan Study 2007, II-1-25.

<sup>4</sup> National Hydropower Master Plan Study 2007, II-1-3.



to fill a substantially bigger role in power generation in the coming years, hydropower has no use other than production of electricity.

- It is by far the largest of Vietnam's renewable energy resources and much of the resource can be developed economically now.
- When developed with proper attention to environment and social issues, hydropower offers significant benefits over fossil fuel generation, particularly from the point of view of reducing greenhouse gas emissions.

52. About 5,000MW of large and medium hydro and perhaps 3,000MW of small hydro (below 30MW) potential could be developed over the medium term. All the large and medium hydropower is below the cost of the alternative of fossil fuel generation and thus its development is both economically advantageous and it will defer the construction of fossil fuel plants and, at the margin, reduce the extent to which those plants are dispatched.

53. Notwithstanding these attractions, large scale development of hydropower cannot substitute entirely for expansion of the thermal power system; there needs to be reserve margin sufficient to meet demand during the dry season, or unexpected outages of hydropower. If there are further important discoveries of gas, and improvements in the institutional framework are put in place, gas-fired generation could remain an attractive alternative to coal. In any event, Vietnam must eventually transition from a hydro-dominated system to a thermal dominated one, but supporting hydropower development now defers that transition while also bringing substantial economic and financial benefits.

54. Vietnam's program to develop the bulk of its medium-sized hydro sites over the next ten years will provide a core contribution to the overall power development program in each of the country's three geographic regions. Virtually all of the 30-odd projects were assessed by joint international and domestic teams as part of the five-year, multi-phase National Hydropower Plan Study, completed with Scandinavian assistance in 2005. Economic returns of most of the projects, compared with alternatives, are high. Resettlement requirements vary from a handful of people to several thousand. Preliminary environmental impact screening shows substantial variation in potential impacts, based on site specifics. The challenge will be in effective implementation—to maintain quality project development under the pressure for speed to meet ever-climbing load growth.

55. Others have observed that Vietnam's aspiration to be a middle income country is not simply focused on a monetary value but also fosters a wider acceptance of societal change. Consequently, senior figures in the Government and EVN's management recognize that traditional Vietnamese approaches to the development of hydropower – which largely rely on rules-based methods – must change. For example approaches to reservoir resettlement, livelihood restoration, dam safety and the management of environment impacts are now the subject of public debate in the press and questioning in the National Assembly. The emergence of a younger, more energetic generation of managers, often with training from outside Vietnam has brought about greater openness and interest in new ideas and ways of doing business. Hence providing a major, practical example of adaptation of selected new approaches from abroad to Vietnamese conditions, largely undertaken by Vietnamese experts and counterparts would provide a powerful tool to bring change, and help provide working models for other hydropower efforts in Vietnam.

## Annex 2: Major Related Projects Financed by the Bank and/or other Agencies

### VIETNAM: VN-Trung Son Hydropower Project

1. Major related projects financed by the Bank are shown in Table A2.1. Ratings for active projects are taken from the most recent ISR; for closed projects the last ISR before closing. Projects financed by other agencies are shown in Table A2.2.

**Table A2.1: Major Related Projects Financed By the Bank**

Project	Sector Issue Addressed	Latest Supervision (ISR) Rating	
		DO	IP
Second Rural Energy Project (Cr. 4000-VN, FY05). Additional financing (Cr. 4576-VN, FY09).	Improving access and service quality for rural communities, implementing reforms by creation of legal forms of LDUs and supporting their development as businesses.	S	S
Rural Distribution Project (Cr. 4444-VN, FY 08).	Constructing and rehabilitating rural power distribution systems to improve quality and availability of power; Building capacity of selected power distribution companies.	S	S
Transmission, Distribution and Disaster Reconstruction (Cr. 3034-VN FY 98). Project completed.	Financing transmission and distribution; Implementing reforms to EVN's transmission function, unbundling it from generation and ensuring its efficient development.	S	S
System Efficiency Improvement, Equitization and Renewables Project (Cr. 3680-VN FY02). Additional financing (Cr. 4781, FY10).	Optimizing power investments and financing transmission and distribution to improve overall system efficiency; Improving access and service quality through enhancing energy provision for the poor; Sustaining reform of the power sector through separation of generation, transmission and distribution by institutionalizing transfer pricing, improving corporate governance and equitization to develop a creditworthy distribution sector.	S	S
Second Transmission and Distribution (Cr. 4107-VN FY06).	Financing transmission and distribution for the efficient development of Vietnam's transmission & distribution system.	S	S
Phu My 2.2 Guarantee Operation (B-004- 0-VN, FY 03).	Financing investment in generation by mobilizing private sector financing.	S	S
Renewable Energy Development Project (Cr. 4564-VN, FY 09).	Increasing the supply of electricity to the national grid from renewable energy resources; encouraging private sector developers of small renewable energy projects.	S	S
First Power Sector Reform Development Policy Operation (Ln. 7868-VN and Cr. 4711-VN, FY10).	Supporting the Government of Vietnam's implementation of a market for electricity generation, restructuring of the power sector and reform of tariffs to facilitate effective competition, transparency and predictability, encourage timely generation investment, improve system operational reserve and provide incentives for efficient use of electricity.	S	S
Vietnam Water Resources Assistance Project (Cr. 3880-VN, FY03).	Establish effective systems of dam safety management and lower the risks associated with dams.	S	S

IP/DO Ratings: HS (Highly Satisfactory), S (Satisfactory), U (Unsatisfactory), HU (Highly Unsatisfactory)

**Table A2.1: Major Related Projects Financed by Other Agencies**

<b>Project</b>	<b>Sector Issue Addressed</b>
AfD (France)	
Mekong Rural Electrification (2000)	Improving access and service quality
Asian Development Bank (ADB)	
Power Distribution and Rehabilitation (LN 1368-VIE of June 1995), Central and Southern Vietnam Power and Distribution (LN 28187-VIE of November 1997); Northern Power Transmission Project (LN 2128-VIE, December 2004) Song Bung 4 Hydropower Project (LN 2429-VIE, June 2008) Renewable Energy Development and Network Expansion and Rehabilitation (LN 2517-VIE March 2009) Guarantee for Investment Support for EVN (LN 2604-VIE, December, 2009).	Financing transmission investments, financing generation.
Japan Bank for International Cooperation (JBIC)	
Construction of Phu My 1 Power Plant (January 1994), Pha Lai 2 Power Plant (January 1994), Ham Thuan Da Mi Power Plant (January 1994), Da Nhim Power Plant (March 1997), O Mon Thermal Power Plant and Mekong Delta Transmission Network Project (Four Loans, March 2001 – March 2007).	Optimizing power investments and financing generation.
Swedish International Development Agency (SIDA)	
Construction of Song Hinh Power Plant (1995), six transmission substations for 110 kV (1998), Extension of transmission substations for 500 kV (1998), Upgrading distribution network in Central Area.	Financing transmission and distribution

2. The World Bank's support for the power sector is based on a dynamic mix of analytical and advisory activities, IBRD/IDA lending, guarantees and facilitating involvement of other parts of the World Bank Group as needed. This multi-track approach within a well-defined but flexibly-structured program has proved effective in achieving major impacts in several sub-sectors of the power sector, including in generation, transmission and distribution, private sector participation in generation, rural electrification, renewable energy and demand side management. The support is grouped around four themes:

- Efficient and sustainable expansion of physical system capacity. The current portfolio reflects the continued need to support expansion of generation capacity and improvements in supply side capacity and efficiency in the transmission and distribution systems. Current projects supporting this area are the System Efficiency Improvement, Equitization and Renewables Project (SEIER, Cr. 3680 and TF051229) and Second Transmission and Distribution Project (TD2, Cr. 4107). IDA has also been the most significant financier of Vietnam's major and quite successful rural electrification and rehabilitation program, with Second Rural Energy Project (RE2, Cr. 4000 and its Additional Financing Cr. 4576) and Rural Distribution Project (RD, Cr. 4444) now under implementation. The Trung Son Hydropower Project will further support this theme;
- Fostering private sector participation. IDA has supported private sector participation through a guarantee operation for the Phu My 2.2 BOT gas fired power plant (GU B-004-0 VN). The Multilateral Investment Guarantee Agency (MIGA) has provided a

guarantee for the Phu My 3 BOT power plant. International Finance Corporation (IFC) is advising MoIT on the Nghi Son 2 BOT plant currently being bid;

- Promoting renewable energy and energy efficiency. With GEF co-financing through SEIER and now through the stand alone Renewable Energy Development Project (REDP, Cr. 4564), the Bank is supporting the development of renewable energy, principally small hydro (below 30MW). Through SEIER and the stand-alone GEF Demand Side Management and Energy Efficiency Project (DSM&EE, TF 051256), the Bank is supporting improvements to demand side energy efficiency; and
- Supporting sector reform. Through both recipient- and Bank-executed technical assistance, the Bank has been involved in sector reform since the start of the reform process. All the projects noted above include some element of support for sector reform, restructuring of power sector operations and unbundling of generation, transmission and distribution and equitization and are now underpinned by the First Power Sector Reform Development Policy Operation (Ln. 7868 and Cr. 4711) with technical assistance to the Electricity Regulatory Agency of Vietnam (ERAV) being provided by SEIER Additional Financing (Cr. 4781). Outcomes achieved from this include the further development of policy for BOT power plants, separation of power transmission assets into NPTC and adoption of pricing systems for renewable energy.

3. Portfolio performance is generally good, with high levels of disbursement (21 percent in FY08, 25 percent in FY09, 24 percent in FY10) with high levels of realism. All projects completed to date have achieved satisfactory outcomes. The AAA program is selective and integrated with the four themes discussed above.

**Annex 3: Results Framework and Monitoring**  
**VIETNAM: VN-Trung Son Hydropower Project**

**Results Framework**

**PDO LEVEL RESULTS**

<b>Project Development Objective (PDO):</b> To supply least-cost electric power in a safe and environmentally and socially sustainable way.									
PDO Level Results Indicators	Core	Unit of Measure	Baseline	Cumulative Target Values		Monitoring			
				MTR (Q4, 2014)	Completion (Q2, 2017)	Frequency	Data Source/ Methodology	Responsibility for Data Collection	Description (indicator definition etc.)
<b>Indicator One:</b> Amount of electrical energy and peaking capacity provided by the Trung Son Hydropower Plant	<input type="checkbox"/>	GWh/year MW	Year: 2010; measure: 0		1,019 GWh/year 43.5 MW	Once, at dam commissioning	Project operating reports	TSHPCo	Measures increase of supply
<b>Indicator Two:</b> Economic and financial cost of electricity from Trung Son Hydropower Plant	<input type="checkbox"/>	Economic: ERR, NPV  Financial: VND/ kWh (real, 2010)	n/a	Economic: 18.9%, \$361 million  Financial: VND 607/kWh	Economic: 18.9%, \$361 million  Financial: VND 607/kWh	Twice in project, on signature of main contracts and on completion	Contracts and financial economic reports, analysis	TSHPCo	Measures whether power supply is least cost; to be expressed as % of avoided cost of shoulder power as benchmarked by ERAV. Financial based on fixed return on equity of 10 percent.
<b>Indicator Three:</b> Livelihoods of those affected by project at least maintained at pre-project levels	<input type="checkbox"/>	Living standards score	Year: 2010; measure: 100	Living standards score not less than 100 for 100% of all DPs	Living standards score not less than 100 for 100% of all DPs	Six monthly	Independent Monitoring Consultant Review  At MTR and completion, a quantitative consumption and assets survey, as benchmark	IMC and TSHPCo	Percentage of affected households with living standards improved at start of dam operation, compared with pre-project, and satisfaction with maintenance of cultural identity
<b>Indicator Four:</b> Evidence of satisfactory compliance with the Environment Management Plan	<input type="checkbox"/>	Pending cases of non-compliance	Year: 2010; measure: no impacts	No pending cases	No pending cases	Six monthly	Independent Monitoring Consultant Review	IMC and TSHPCo	Measures extent to which environmental impacts are minimized

## INTERMEDIATE RESULTS

Intermediate Indicators	Core	Unit of Measure	Baseline	Target Values				Monitoring			
				QTR (Q3, 2012)	MTR (Q4, 2014)	3QTR (Q1, 2016)	Completion (Q2, 2017)	Frequency	Data Source/ Methodology	Responsibility for Data Collection	Description (indicator definition etc.)
Intermediate Result, Dam and Ancillary Construction Component: providing the basis on which least cost electric power is generated											
Intermediate Result indicator One: Progress in procurement of three main contracts: main works, electro mechanical equipment and owner’s engineer	<input type="checkbox"/>	% Completion	Year: 2010; measure : 0	100%	100%	100%	100%	Quarterly	Quarterly progress reports	TSHPCo	Bid documents prepared = 25%; Issued = 50% Evaluation complete = 75% Contracts = 100%
Intermediate Result indicator Two: Construction of dam and appurtenant structures	<input type="checkbox"/>	% Completion	Year: 2010; measure : 0	0	0	50%	100%	Quarterly	Quarterly progress reports	TSHPCo	Completion of physical works and installation of equipment. 100% on commissioning of fourth turbine
Intermediate Result indicator Three: Construction of access road and bridges	<input type="checkbox"/>	% Completion	Year: 2010; measure : 0	50%	100%	100%	100%	Quarterly	Quarterly progress reports	TSHPCo	Completion of physical works, 100% when enters service
Intermediate Result indicator Four: Construction of power supply lines	<input type="checkbox"/>	% Completion	Year: 2010; measure : 0	25%	100%	100%	100%	Quarterly	Quarterly progress reports	TSHPCo	Completion of physical works, 100% when enters service
Intermediate Result, Transmission Line Construction: the means by which power generated is moved to consumers											
Intermediate Result indicator One: Construction of 220kV power evacuation transmission line	<input type="checkbox"/>	% Completion	Year: 2010; measure : 0	0	0	50%	100%	Quarterly	Quarterly progress reports	NPPMB	Completion of physical works and installation of equipment. 100% when line is completed

Intermediate Indicators	Core	Unit of Measure	Baseline	Target Values				Monitoring			
				QTR (Q3, 2012)	MTR (Q4, 2014)	3QTR (Q1, 2016)	Completion (Q2, 2017)	Frequency	Data Source/ Methodology	Responsibility for Data Collection	Description (indicator definition etc.)
Intermediate Result, Social and Environment Impact Mitigation Component: ensuring socially responsible and environmentally sustainable construction and operation of the Trung Son Hydropower Plant											
Intermediate Result indicator One: Resettlement compensation: households fully compensated	<input type="checkbox"/>	% Compensated	Year: 2010; measure : 0	25%	100%	100%	100%	Six monthly	Quarterly progress reports, IMC six monthly reports	TSHPCo, IMC	Fully compensated means all lump sum payments made, recorded in resettlement record book, and taking place before construction start
Intermediate Result indicator Two: Livelihoods development: capacity enhanced in all villages	<input type="checkbox"/>	% Villages with active livelihood program	Year: 2010; measure : 0	25%	100%	100%	100%	Six monthly	Quarterly progress reports, IMC six monthly reports	TSHPCo, IMC	
Intermediate Result indicator Three: Effective awareness of all ethnic groups of health risks	<input type="checkbox"/>	% Completion	Year: 2010; measure : 0	25%	100%	100%	100%	Six monthly	Quarterly progress reports, IMC six monthly reports	TSHPCo, IMC	Surveys show at least 75 percent of sample from each ethnic group are generally aware of risks = 100%
Intermediate Result indicator Four: Public Health Action Plan being implemented in project communes	<input type="checkbox"/>	% Communes in which PHAP in place	Year: 2010; measure : 0	0	25%	50%	100%	Six monthly	Quarterly progress reports IMC six monthly reports	TSHPCo, IMC	PHAP in place when at least one PHAP activity is under way
Intermediate Result indicator Five: Environment management plan completion and successful in reducing impacts as expected	<input type="checkbox"/>	% Completion of EMP	Year: 2010; measure : 0	20%	40%	60%	100%	Six monthly	Quarterly progress reports IMC six monthly reports	TSHPCo, IMC	Progress towards completion: contracted = 25%; completed = 75%; Demonstrable reduction of impacts = 100%.
Intermediate Result indicator Five: Corrective actions or new adaptive management programs implemented if existing mitigation measures do not reduce or eliminate impacts	<input type="checkbox"/>	% Actions or programs implemented following agreement with IMC	Year: 2010; measure : 0	100%	100%	100%	100%	Six monthly	Quarterly progress reports IMC six monthly reports	TSHPCo, IMC	Default is 100%. If actions identified as needed but not adopted, then proportion of plans adopted out of total identified is score.

Intermediate Indicators	Core	Unit of Measure	Baseline	Target Values				Monitoring			
				QTR (Q3, 2012)	MTR (Q4, 2014)	3QTR (Q1, 2016)	Completion (Q2, 2017)	Frequency	Data Source/ Methodology	Responsibility for Data Collection	Description (indicator definition etc.)
Intermediate Result, Capacity Development and Scale-up Component: scaling up the impact of the environmental sustainability and socially responsible construction of the plant by leveraging the knowledge gained to other projects in Vietnam											
Intermediate Result indicator One: Pipeline projects incorporating international technical, social and environment standards	<input type="checkbox"/>	Number, progress	Year: 2010; measure : 0	Activities identified	Support studies under way	Support studies under way	Support studies complete	Quarterly	Quarterly progress reports	TSHPMB, EVN	



## **Annex 4: Detailed Project Description**

### **VIETNAM: VN-Trung Son Hydropower Project**

#### **PROJECT OUTLINE**

1. The Trung Son hydropower plant will be constructed on the Ma River, near to Co Me village in the territory of Trung Son commune, Quan Hoa district, Thanh Hoa province. This will be the first dam on the Ma River, which rises in Dien Bien Province of Vietnam, flows into Laos, and re-enters Vietnam about 48 km above the planned dam site. Downstream of the dam, several tributaries flow into the Ma before the confluence with the Chu river close to Thanh Hoa City, about 30 km above where the combined Ma-Chu River flows into the sea. Maps of the project area are provided at Annex 17 which can be folded out and reviewed while reading this Annex.
2. The plant will have an installed capacity of 260 MW and will produce 1,019 GWh in an average year, generated from four Francis-type turbines each coupled to a generator. The dam will create a reservoir 38.5km long, the tail of which will be about 9.5 km downstream from the Laotian border; the reservoir will include small parts of several branches of the Ma River. The total reservoir volume will be about 348.50 million m<sup>3</sup> including a flood control volume of about 112 million m<sup>3</sup>. It will cover an area of about 13.13 km<sup>2</sup>, inundating mixed forest and agricultural land.
3. Ancillary construction work for the project includes improving an unmetalled road that runs between the village of Co Luong on National Highway 15, the nearest metalled road, and the dam site. It will mainly follow the course of the river valley but in some places new alignments will bypass existing villages, facilitate construction or minimize resettlement. Additional roads will be built within the area of the construction site. A 35kV line from Ba Thuoc to Co Me via Co Luong will supply power during construction; in later stages of construction, from about 2012, the supply for the 35kV line will be switched from Ba Thuoc to the planned Mai Chau 110/35kV substation. A 220kV transmission line will connect the hydro plant's switchyard to a grid connection point an estimated 65 kilometers away in Tan Lac District in Hoa Binh Province.
4. The project area is defined by the areas affected by environmental or social impact in the Trung Son hydropower project. It consists of the commune that is immediately upstream of the reservoir, and all communes bordering either the reservoir above the dam or the river below it as far as the confluence with the Luong River approximately 65km downstream of the dam. It also includes the communes through which the power lines and access road are proposed to run.
5. The project will include resettlement, compensation and restoration of the livelihoods of approximately 10,600 people who will be directly or indirectly impacted by the construction of the dam and the ancillary works. The majority of these people are from the Thai, Muong, H'mong and Kho Mu ethnic minorities. The Thai and Muong live mainly in the lower lands, are often closely integrated with the Kinh majority and tend to be better off than the H'mong, who live in the uplands, especially further up the river from the dam site. The Kho Mu live alongside Thai people in Doan Ket village at the tail of the reservoir. Twelve resettlement sites are planned for five communes: Trung Son, Tan Xuan, Trung Ly, Muong Ly and Tam Chung.
6. The project will also include mitigation of the main environmental consequences, on water quality, hydrology, health, fish and fisheries – both upstream and downstream of the dam;

the impact of the construction workers' camp; the impacts of auxiliary project components including the access road and borrow pits; and indirect impacts on the area's natural resources and biodiversity, including adjacent nature reserves. All planned resettlement sites are within affected communes. The social and environment impacts of the project are discussed in greater detail in Annex 10.

7. To leverage the additional knowledge, skills and capacity that is built up from the development and implementation of the project, a component will build capacity of EVN to prepare further hydropower projects to international standards.

## PROJECT COMPONENTS

### Components and Relation to PDO Objectives

8. The project will consist of four components which are listed and related to the project development objective of supplying least-cost electric power in a safe and environmentally and socially sustainable way as follow:

- The Dam and Ancillary Construction Component, providing the basis on which least cost electric power is generated;
- The Transmission Line Component is the means by which the power generated is moved to electricity consumers;
- The Social and Environment Impact Mitigation Component ensures the environmental sustainability and socially responsible construction and operation of the Trung Son Hydropower Plant;
- The Capacity Development and Scale-up Component scales up the impact of the environmental sustainability and socially responsible construction of the plant by leveraging the knowledge gained to other projects in Vietnam.

9. Total project cost is estimated at \$411.72 million including an unallocated amount of \$12.33 million, contingencies, interest during construction (IDC) and front end fee, for which an IBRD loan of \$330 million is sought. The project components are as follow, costs of which do not include physical contingencies.

Component 1: Dam and Ancillary Construction (cost \$265.23 million, of which IBRD \$238.92 million)

10. The Dam and Ancillary Construction Component will consist of four subcomponents as follow.

#### ***Subcomponent 1a: Dam and Appurtenant Structures (cost \$205.36 million, of which IBRD \$204.83 million)***

11. The construction work on the main dam consists of the following: coffer-dam and diversion work; headworks consisting of main dam, spillways, and instrumentation; design and manufacture of mechanical equipment for culverts, and installation of spillway gates and associated hydraulic-mechanical equipment; the power generation facilities consisting of forebay, intake, penstocks, turbine and control buildings; discharge canal; and switchyard.

12. Goods to be supplied consist of the hydraulic-mechanical equipment, electro-mechanical equipment including the turbines, and generators, safety instrumentation, electrical switchgear and control equipment for the switchyard; and control and instrumentation equipment.

13. The subcomponent will also cover the construction of material quarries, borrow pits and roads within the construction area; electricity and water supply in the construction area; and the construction workers' camp and office and living facilities for project staff and their consultants. Construction of hydrological and water quality measuring stations at the tail of the reservoir and below the dam and equipment for the stations will also be financed.

14. Construction contractors will be responsible for environment management and mitigation tasks relating directly to their activities, including, for example: mitigation of short term construction impacts such as noise and dust; the management of the workers' camp and camp followers; waste management and pollution prevention; chance finds of archaeological interest; vegetation clearance and salvage; monitoring of environment management plan; and site remediation on completion of construction. These activities will therefore also be financed under this subcomponent.

***Subcomponent 1.b: Access Road and Bridges (cost \$24.91 million, of which IBRD \$24.91 million)***

15. The road works will consist of construction of a 5.5 meter wide road with total length of 20.4 km from Co Luong village to the entrance to the construction site just to the east of Co Me village. About 7km of the road will be built along new alignments; the remainder will consist of improvements to the existing alignment.

16. Two major bridges will be constructed: at Co Luong, a 132 meter long, 7 meter wide structure; and at Co Me, a 264 meter long, 7 meter wide structure. In addition five minor bridges of between 24 and 33 meters and six meters wide will be constructed over the length of the road.

17. Road and bridge contractors will be responsible for: construction; environment management and mitigation tasks relating directly to their activities, including, for example: mitigation of short term construction impacts such as noise and dust; chance finds of archaeological interest; vegetation clearance and salvage; monitoring of environment management plan; and site remediation on completion of construction. These activities, to the extent that they pertain to road and bridge construction, will therefore also be financed under this component.

***Subcomponent 1.c: Construction of Power Supply Lines (cost \$2.43 million, of which IBRD zero)***

18. This subcomponent will finance the extension of the existing 35kV line from Ba Thuoc to Co Me via Co Luong village from its currently-planned termination at Co Me village by a further 1.5 km to the project site. A further 35kV line will be constructed from the planned Mai Chau 110/35kV substation to Co Luong and will supplement supply to the project site as loads there grow. The component will also finance the construction of the Mai Chau 110/35kV substation and branch from the existing Hoa Binh – Nho Qua 110kV line. It will finance supply of electrical goods including 110/35kV transformers, primary substation equipment, control and protection systems, conductors, insulators, poles and towers, and works to construct substations and power lines.

***Subcomponent 1.d: Project Management (cost \$32.53 million, of which IBRD \$9.18 million)***

19. The consulting services to be provided to support the implementation of the component include design consultants, engineers for supervision and management of the main construction work and for the road and bridges, covering monitoring of construction progress, quality assurance and environmental performance of the contractors. The component will also finance

consulting services for independent monitoring of the environment and social performance of contractors and supervising engineers and the continued operation of the PTAP. Individual consultants to support TSHPCo will also be financed under this component.

Component 2: Transmission Line (cost \$18.44 million, of which IBRD \$18.44 million)

20. The transmission line will connect the hydro plant's switchyard to a grid connection point an estimated 65 km away in Tan Lac District in Hoa Binh Province. Feasibility studies for design and alignment are not likely to be started until sometime in 2012, as operation of the power plant is not likely to begin until 2016. At present, it is expected that the component will support construction of a double circuit 220kV transmission line. The alignment is expected to run parallel with the road constructed for dam site access, turn north at Co Luong to the vicinity of Mai Chau before heading east to Tan Lac District. This component will finance transmission line goods including towers, insulators, conductors, optical ground wire and accessories, and the construction of the transmission line which will also include implementing an environment management plan for the works. It will also finance an independent environment and social monitoring consultant to monitor compliance with environmental and social requirements for the component.

Component 3: Social and Environment Impact Management (cost \$43.42 million, of which IBRD \$23.81 million)

21. The Social and Environment Impact Management Component will finance two activities, and three subcomponents. The two activities are the continued operation of the environment and social panel of experts (PoE) and the establishment and operation of a community relations office. The three subcomponents are as follow.

***Subcomponent 3a. Resettlement, Livelihoods and Ethnic Minorities Development (cost \$40.52 million, of which IBRD \$20.91 million)***

22. The Resettlement, Livelihoods and Ethnic Minorities Development Subcomponent will finance the implementation of the Resettlement, Livelihoods and Ethnic Minorities Development Program. This covers resettlement, rehabilitation, compensation and livelihoods development measures that will assist people impacted by the project to improve, or at least maintain, their pre-project living standards and income earning capacity. It will also finance activities to help ethnic minorities to maintain their cultural identity. Bank financing will not be used to acquire land.

23. Items to be financed are: construction of resettlement areas including infrastructure to and within new communities – roads, bridges, wharves, water, electricity and sanitation, houses and related structures; moving of tombs and religious artifacts and associated ceremonies; and removal of households from their existing villages to the resettlement sites. The subcomponent will finance works related to agricultural improvements including irrigation and field improvements such as terracing and planting or replanting of perennial crops. It will finance community livelihood improvement plans (CLIPs), including improvements to existing farming systems such as improved livestock and crop raising and diversification activities supporting vocational training, support to local microenterprises and other job creation activities. The subcomponent will finance capacity building for the TSHPCo and local government staff.

***Subcomponent 3b. Health Support (cost \$0.60 million of which IBRD \$0.60 million)***

24. The Health Support Subcomponent will finance the implementation of the first phase of the Public Health Action Plan (PHAP) in the project area. The PHAP covers a program directly

targeted to resettlers and a regional health program for others in the area. It includes the upgrading of public health infrastructure, health awareness programs, strengthening human resources in public health and health monitoring and surveillance.

25. Financing will cover construction of a new commune health center and rehabilitation of existing ones and provision of medical and other equipment to the centers, health education through provision of training and outreach to people in the project area, capacity building for public health workers and the PMB through training and consultancy, and monitoring and surveillance through training and consultancy.

***Subcomponent 3c. Environment Management (cost \$2.30 million, of which IBRD \$2.30 million)***

26. This Environment Management Subcomponent will finance those parts of the environment management plan that are not covered by requirements placed on construction contractors which are covered under Component 1. This component will finance other activities covered by plans for the management of biodiversity and protected areas and physical cultural resources. It will also finance further studies on water quality, maintaining a part of the Ma river intact and cumulative environment impacts in the river basin. A significant amount of training and capacity building will also be undertaken for TSHPCo.

27. Activities to be financed include the construction of a forest management and protection station, the purchase and fixing of boundary markers for protected areas and other goods to enable forest protection workers to carry out their duties, and training and capacity building for the workers. Forest replanting in the project area will also be financed. Under this subcomponent, two sites of archaeological interest: a Paleolithic site at Nang village in Muong Ly commune ;and a burial area of Huoi Pa near Ta Ban village in Trung Son commune; will be excavated and any finds removed and preserved. The subcomponent will finance consultant services to carry out the studies and to support training and capacity building.

**Component 4: Capacity Development and Scale-up (cost \$3.00 million, of which IBRD \$3.00 million)**

28. The Capacity Development and Scale-up Component will take advantage of the lessons learned during the development of Trung Son Hydropower Project. It will finance capacity strengthening activities to bring EVN hydropower projects up to international standards. Support to be provided is expected to include studies on planning and implementation for social development including social assessment, livelihood restoration and benefit sharing studies, especially as they relate to addressing impacts on ethnic minorities, developing consultation methods and monitoring and evaluation protocols; environment and health management, basin management plans integrated with other water uses, studies of cumulative impacts of projects, consideration of alternatives and mitigation measures; hydrology and dam safety; project preparation and management, including contract management; and preparation of financial and economic documents to support searching for finance. The component will finance consultant services in support of preparation, goods such as office equipment and software, training and capacity building including study tours.

**TECHNCIAL DESCRIPTION**

29. This section includes a more detailed description of the technical features of the dam and the rationale for the dam design.

## Hydrology

30. The Ma River originates in Dien Bien province in the northwest mountains of Vietnam at elevation 2,179 m, runs south-eastward into Laos territory, re-enters Vietnam and continues to the East Sea. The topography is mainly mountainous and highlands. The average elevation of the basin is approximately 760 m. From the source to the estuary, the main stem of the Ma River is 512 km long, with 410 km in Vietnam. The Ma River has 39 tributaries of which the largest are the Chu, Luong, Buoi and Lo Rivers. The catchment basin area of the Ma River above the dam site is 13,175 km<sup>2</sup>, with 8,500 km<sup>2</sup> in Vietnam and 4,675 km<sup>2</sup> in Laos.

31. Hydrological parameters for the feasibility study and designs were developed based on data from 15 meteorological stations, 10 rainfall stations and 14 hydrological gauging stations throughout the Ma River basin with long-term records dating back to 1955. Most of the records are intermittent and incomplete.

32. The rainy season at the dam site is from June to October. Long-term average rainfall in the basin is 1,420 mm per year. Annual average river flow is 234 m<sup>3</sup>/sec at the dam site. Average annual total runoff is 7.4 million m<sup>3</sup>.

33. The annual peak flood normally occurs in August on the Ma River and September on the Chu River. The Vietnamese Center for Applied Hydrology developed the Probable Maximum Flood (PMF). The estimated design flood peak discharges on the Ma River at the dam site are as shown in Table A4.1:

**Table A4.1: Design Flood Peak Discharge at Trung Son Dam Site**

	PMF	0.1	0.5	1	5	10
Frequency (%)	(72-hour)	1,000	200	100	20	10
Period (years)		13,400	10,400	9,100	6,200	5,000
Flow (m <sup>3</sup> /sec)		31,100	13,400	10,400	9,100	6,200

34. Based on limited data and a mathematical model, the estimated sediment accumulation in the reservoir upstream of the dam at the end of 100 years of operation is approximately 110 million m<sup>3</sup>. This corresponds to a sediment depth of about 13.53 meters and top of sediment elevation 96.04 meters at the upstream face of the dam, 37.26 meters below the invert elevation of the power intakes. This volume also represents about 45% of the dead storage volume of 236.4 million m<sup>3</sup> in the reservoir.

## Geology

35. Geological mapping was completed to identify the soil and rock types and the orientation of joints and faults in the dam foundation. The dam site is underlain entirely by the Song Ma formation consisting of micaceous quartz schist and sericite quartz schist, which are semi hard rock. The upper layers of the rock are highly weathered and unstable. The foundation is primarily one rock type and the joint planes are uniform in the cross-valley orientation, which indicates the dam will be founded on a relatively weak rock foundation. There are many small faults crossing through the dam foundation creating many planes of potential weakness and permeability. The configuration of these planes and the subsequent permeability is complex.

36. Depth of excavation of overburden soils and weathered rock will likely vary from 5-40 meters across the river along the dam alignment to reach sound rock for the dam foundation.

The dam structure will be founded on hard rock, which has been judged relatively impermeable. Consolidation grouting to a depth of about five meters and a grout curtain to a depth of 15-40 meters below the base of the dam will be required to reduce the permeability and improve the stability of the rock in the foundation. The small faults crossing the foundation will be excavated and backfilled with concrete to a depth equal to approximately two times the width.

37. The dam will be located in an area of potentially strong seismic activity. The BU3 fault, a branch of the regional Son La fault, is approximately 7.7 km from dam site. The fault is considered active and the most critical source of potential earthquake ground motion for the dam. The geological studies completed for the project estimate the Maximum Credible Earthquake generated by the BU3 fault to be a 6.07 Richter event with a horizontal peak ground acceleration of 0.24g. The Operating Basis Earthquake was estimated to produce a horizontal peak ground acceleration of 0.16g. These earthquake loadings were used in the stability and stress analysis of the dam, spillway, powerhouse and other appurtenant structures.

38. The best source of rock for the production of aggregate for roller compacted concrete (RCC) and conventional concrete (CVC) for the project is the quarry on the left bank of the river approximately 8 kilometers upstream of the dam site above the normal reservoir water surface. A more than sufficient layer of granite rock is available for aggregate production at this quarry site. The best source of sand appears to be from crushing the granite to produce aggregate for RCC and CVC. Other sand sources are too far from the site. Soil for the cofferdams can come from the excavations for the dam abutments.

39. Some landslides have been observed along the Ma River, primarily in the thick layers of residual soil and zones of highly weathered rock. These landslides occur mostly during the rainy season and their volume is usually relatively small. Landslides along the river are not expected to be an issue at the dam site due to the heavy vegetation.

40. The reservoir perimeter consists of impermeable bedrock formations that will prevent water loss into the rock formations or into other basins. Reservoir rim stability due to saturation is not expected to be a problem.

#### Geotechnical

41. During the feasibility study, four alternative sites and alignments were evaluated for alternative dam types. Subsurface investigations along each alignment consisted of numerous drill holes, test pits, an exploratory adit and in-situ permeability tests. Rock and soil samples were tested in the laboratory to develop physical properties for the development of designs. Field tests were performed to determine the shear strength of the contact between concrete and the rock foundation. Based on the results from the feasibility study, two dam alignments were selected for further study.

42. Two dam types were evaluated at the selected dam site alignments; roller compacted concrete (RCC) and concrete faced rockfill (CFRD). The overburden soils at the site are not available in sufficient quantities suitable for an earthfill dam. The two viable alternatives were compared based on costs and other factors. The primary difference between the two dam types is that the CFRD will require the spillway to be located on the abutment, which significantly increases the quantity of excavation and the total cost for the dam and spillway. The RCC dam has the advantage of the spillway being integral with the structure and located in the riverbed, which not only reduces total excavation quantities, but also reduces the potential for excessive

erosion of the river bank downstream of the spillway. In addition, river diversion conduits for the CRFD would be longer and more complicated and thereby more expensive. Based on the comparative cost estimates, the RCC dam was estimated to be approximately 20% less expensive than the CFRD.

43. Stability analyses of the RCC dam, spillway and foundation have been performed for all loading conditions, including earthquake forces for the Operating Basis Earthquake and Maximum Credible Earthquake and the PMF water reservoir water level. The analyses were based on the physical properties of the foundation rock obtained from the laboratory and in-situ tests.

#### Civil Works

44. Trung Son will be the first and largest of a series of seven dams planned for construction on the Ma River for water supply, flood control and power generation. The dam will be 84.50 meters high with a crest length of 513.0 m at elevation 163 m. The dam structure will be constructed using roller compacted concrete (RCC) with sloping upstream and downstream faces to provide the mass required to resist the forces from earthquake and PMF loadings. The dam will contain 774,000 cubic meters of RCC and 369,000 cubic meters of CVC.

45. The main spillway will be located near the center of the dam and discharge into the river channel. The spillway will contain six large radial gates, each 14 meters by 15 meters to maintain the reservoir water level and control discharges. A flip bucket and plunge pool at the base of the spillway will provide for energy dissipation. The maximum spillway capacity is 13,056 m<sup>3</sup>/sec with all gates open and the reservoir at maximum water level elevation 162.2 meters.

46. The power waterway intake for the hydroelectric powerhouse is located on the left abutment of the RCC dam. Four intakes and penstocks will supply water to the powerhouse. The intake gates are each 5.5 x 5.5 m. The steel penstocks are 5.5 m in diameter and about 230m long. The powerhouse contains four 65 MW Francis turbines each designed for a flow of 522 m<sup>3</sup>/sec and a maximum water head of about 72 m. Total capacity of the powerhouse is 260 MW. Average annual generated electricity is approximately 1,019 GWh.

47. Initially the spillway was designed according to Vietnamese standards for a 200 year (0.5%) flood and checked for a 1,000 year (0.1%) flood. The requirement to pass the PMF without jeopardizing the safety of the dam and other project features led to the recommendation of a fuse dam and emergency spillway. Sand for the fuse dam construction can be obtained from three borrow areas identified during the feasibility studies for the project 45-65 kilometers from the project site. Soil materials for construction of the fuse dam can be obtained from nearby borrow areas on each side of the river and from excavations for the dam and powerhouse. A hydraulic physical model study of the fuse dam will be completed to provide parameters for final design and to ensure the fuse dam will perform as anticipated.

48. The fuse dam emergency spillway will be located in a natural saddle near the left abutment of the RCC dam to bypass flood flows greater than the capacity of the main spillway and prevent overtopping of the main dam during the PMF. The fuse dam is 23.8 m high with a crest length of about 109.4 m at elevation 162.8 m and will be constructed using materials from nearby borrow areas. The emergency spillway has a width of 62.0 m at elevation 140.0 m and a capacity of 16,010 m<sup>3</sup>/sec. The fuse dam is suitable for the site topography, requires only a small



amount of additional land and does not encroach on other project features. An added advantage of this option is that it does not require modification of other project structures already designed.

49. A reinforced concrete diversion conduit will be located on the left side of the river at the base of the RCC dam to bypass river flows during construction. The total capacity of the three barrel diversion conduit is 6,200 m<sup>3</sup>/sec, which is the estimated flow for the 20-year flood.

50. The estimated sediment accumulation in the reservoir upstream of the dam at the end of 100 years of operation is approximately 110 million m<sup>3</sup> which would reach about 37.26 meters below the base of the power intakes. To mitigate the risk of increased rates of sedimentation, the diversion conduit will be converted to perform as a sediment sluice during operation. Additional benefits of including a sluice are that it would: reduce the size of the emergency spillway needed to pass the PMF; enable dewatering of the reservoir to 86m elevation for maintenance; ensure an environmental flow during filling and dry seasons if there is insufficient volume to run a single turbine; and allow both reservoir top water and bottom water to be discharged, thus improving downstream water quality.

### Plant Operation

51. Unlike some of the other hydro projects in the EVN system, Trung Son provides no seasonal carryover storage, and its active storage of 112 million m<sup>3</sup> represents only a few days of storage at average inflow. Trung Son operates as a daily peaking project during the dry season, and in effect as a baseload plant for much of the wet season when all four units run 24 hours a day for extended periods.

#### ***Dry vs. wet season operations***

52. During the dry season, the objective is to maintain the reservoir level as high as possible to maximise the hydraulic head. This level should be reached each day at the beginning of the peak hours; the subsequent peak hour discharge is constrained in such a way that the next day's inflow during the off-peak hours should again restore the level to the maximum level. During most of the dry season the inflows are fairly even and predictable, with few if any unexpected storms, so operation fairly close to the theoretical optimum (given the available inflows) is generally achievable.

53. To provide for flood control storage during the wet season, the reservoir is operated at the lower level of 150m. The reservoir must be drawn down from 160m to 150m by July 15, and can be refilled starting September 15. Given the magnitude of monsoon season storms, and the modest flood storage, some spill is inevitable. The flood control storage of 112.13 million m<sup>3</sup> is sufficient to absorb an average daily flow of 1299 m<sup>3</sup>/s – yet the maximum daily discharge can be several times this value. Only in ten of the past 50 years is the maximum daily discharge less than this and even in these years, if there are several days of flows between the maximum discharge capacity of all four turbines (522 m<sup>3</sup>/s) and 1299 m<sup>3</sup>/sec, spill will result. Only in the very dry year of 2006 do simulations show zero spill.

#### ***Limitations on peaking power***

54. In the dry season, the project is to be operated for daily peaking. The inflow is not sufficient to run all units at full power all day, but by storing the inflow in the off-peak hours, full turbine discharge can be achieved during the evening peak. However, during the hours when inflows are being stored, no water would be discharged downstream, causing potential disruption to the downstream environment. Based on an assessment of the natural dry season flows, and the

flow contributions from tributaries immediately downstream of Trung Son, the minimum flow requirement to maintain the downstream ecology is determined to be  $15\text{ m}^3/\text{s}$ . This is insufficient to run one turbine at its minimum discharge of  $52\text{ m}^3/\text{sec}$  and thus must be released through a low-level conduit.

55. In very lean dry seasons, such as 1999, inflows of less than  $52\text{ m}^3/\text{s}$  can persist for several months, so the turbine could not run at this discharge level for 24 hours a day, and discharge from the low-level outlet is unavoidable. Under such conditions the question is whether it is better to release  $15\text{ m}^3/\text{s}$  from the low level outlet for longer periods (i.e. without running through the turbines), but then run the turbines at full discharge for some (limited) number of the peak hours. While this would reduce the *total* energy generated, depending upon the relative financial and economic benefits of peak v. off-peak energy this might still be cost-effective.

56. Another constraint concerns the maximum rate of change of downstream flow. A rapid increase from  $52\text{ m}^3/\text{s}$  to the full turbine discharge of  $522\text{ m}^3/\text{s}$  may be technically possible, but would result in sudden increases in the tail water elevation in addition to the sudden increase in the discharge volume. At  $52\text{ m}^3/\text{s}$ , the tail water elevation is 88.9 meters, rising to 90.2 metres at  $522\text{ m}^3/\text{s}$ . Unexpectedly rapid rises downstream of the dam have safety and environmental implications hence the rate of change in downstream flow should not be greater than that which occurs without the project, which is estimated to be a maximum average rate of change of  $40\text{ m}^3/\text{s}$  per hour. This implies a 11-12 hour period to increase from 52 to  $522\text{ m}^3/\text{s}$  which further limits the proportion of total energy that can be generated during the peak hours.

**Annex 5: Project Costs**  
**VIETNAM: VN-Trung Son Hydropower Project**

**Table A5.1: Project Cost by Component and Use of Financing**

<b>Project Cost By Component and Subcomponent</b>	<b>Local US\$ million</b>	<b>Foreign US\$ million</b>	<b>Total US\$ million</b>
Dam and ancillary construction	26.31	238.92	265.23
Dam and appurtenant structures	0.53	204.83	205.36
Access road and bridges		24.91	24.91
Power supply	2.43		2.43
Project management	23.35	9.18	32.53
Transmission line	0.42	18.03	18.44
Social and environment impact management	40.72	2.70	43.42
Resettlement, livelihoods and ethnic minorities development	38.12	2.40	40.52
Health support	0.60		0.60
Environment management	2.00	0.30	2.30
Technical Assistance to EVN	1.00	2.00	3.00
Total Baseline Cost	68.45	261.64	330.08
Physical Contingencies	14.42	41.74	56.17
<b>Total Project Costs<sup>1</sup></b>	<b>82.27</b>	<b>303.38</b>	<b>386.25</b>
Interest during construction		24.64	24.64
Front-end Fee		0.83	0.83
<b>Total Financing Required</b>	<b>82.87</b>	<b>328.85</b>	<b>411.72</b>

<sup>1</sup>Identifiable taxes and duties are US\$21.46 million, and the total project cost, net of taxes, is US\$390.26 million. Therefore, the share of the project cost net of taxes is 94.8%.

**Table A5.2: Project Cost by Component and Source of Financing**

<b>Project Cost By Component and Subcomponent</b>	<b>Borrower US\$ million</b>	<b>IBRD US\$ million</b>	<b>Total US\$ million</b>
Dam and ancillary construction	26.31	238.92	265.23
Dam and appurtenant structures	0.53	204.83	205.36
Access road and bridges		24.91	24.91
Power supply	2.43		2.43
Project management	23.35	9.18	32.53
Transmission line		18.44	18.44
Social and environment impact management	19.61	23.81	43.42
Resettlement, livelihoods and ethnic minorities development	19.61	20.91	40.52
Health support		0.60	0.60
Environment management		2.30	2.30
Technical Assistance to EVN		3.00	3.00
Total Baseline Cost	45.92	284.17	330.08
Physical Contingencies	11.16	45.00	56.17
<b>Total Project Costs<sup>1</sup></b>	<b>57.08</b>	<b>329.17</b>	<b>386.25</b>
Interest during construction	24.64		24.64
Front-end Fee		0.83	0.83
<b>Total Financing Required</b>	<b>81.72</b>	<b>330.00</b>	<b>411.72</b>

## **Annex 6: Implementation Arrangements**

### **VIETNAM: VN-Trung Son Hydropower Project**

#### **OVERVIEW**

1. Successful implementation of the Trung Son Hydropower Project depends on good arrangement and coordination of the main activities to be carried out. The sequencing of the main tasks to be completed in the project is the basis for the project design, discussed in Annex 4, and implementation, discussed here. In this overview section, the activities to be undertaken are described. There follow sections on the role of project participants, timing and support expected to be provided during implementation.

#### **Dam and Related Construction**

2. It is normal industry practice to have separate contracts for construction and supply of goods rather than adopt a turnkey approach. Few construction companies have adequate expertise to supervise the design, manufacture and installation of complex electromechanical equipment such as hydro turbines, generators and control equipment. Similarly, the limited number of manufacturers worldwide capable of producing large hydro equipment are highly specialized and do not have the capacity to supervise construction works. Neither tends to have the appetite to take the risks associated with areas with which they are unfamiliar, or enter a joint venture in which they would be required to have joint and several liability in the case of their partners' failure to perform.

#### ***Construction***

3. The first construction task is the improvement and construction of new sections of the road from Co Luong to Co Me and the dam site. Concurrent with this will be construction of bridges along the route. The improved road will allow construction materials and machinery to be moved to the project site. Clearance of the route is now almost complete, and the contracts for road construction are under procurement. Contractors for the construction of the road and bridges are expected to start work in June 2011.

4. Some work at the dam site can start during this stage, for example the establishment of water and electricity supply and construction of roads within the site, but the main works must wait about 12 months, until the road is complete. During this waiting period the contractor for the main construction work will be procured. In the main construction stage, the dam and associated structures, including the diversion culvert, excavation and construction of the foundations for the dam, the dam itself and powerhouse and control rooms will be built. The main items of hydraulic, mechanical and electrical machinery such as spillway gates, the turbines, generators and control equipment will be installed in the dam structures. The dam construction is expected to start in June 2012 and continue until the latter half of 2016.

5. When the construction of the main dam is under way, work will start on aligning, clearing the route and constructing the 220kV transmission line that will evacuate power from the plant to Tan Lac where it will link to the national electricity grid. During this time, the 35kV power supply up to the project site will be reinforced; the new Mai Chau 110/35kV substation will be constructed and it will supply the increasing loads at the construction site. The transmission line must be complete when the first turbine is commissioned, currently scheduled for late 2016.

### ***Supply and Installation of Goods***

6. The electro-mechanical equipment, consisting mainly of: the hydro turbines; generators; plant auxiliary equipment; air conditioning and ventilation system; control, supervision and online monitoring system; and communications equipment will be procured at about the same time as the contract for the main works. The supplier will be contracted under supply and installation of plant arrangements. The hydraulic-mechanical equipment – spillway gates and related equipment – will be procured under a goods contract. This equipment will be installed by the main works contractor. Other goods, such as equipment for the switchyard will be procured on a supply of goods basis and installed either by the main works contractor or by specialist installation contractors.

### ***Supervision***

7. Trung Son Hydropower Company (TSHPCo) will hire a consultant firm to act as supervising engineer for the main construction. The consultant will support procurement of the main works and goods contracts; supervision of the construction of the works; supervision of the manufacturing and installation of the equipment; and supervision of those aspects of the environment management plan for which the contractors are responsible.

### **Social and Environmental Impact Mitigation**

#### ***Construction of Resettlement Sites and Livelihood Development Activities***

8. The 11 resettlement sites that will be constructed, and the construction of houses within existing communities for those households which opt to stay in them and request assistance, will be carried out by construction contractors. Infrastructure for the communities, including roads and water supply and also connecting infrastructure such as roads to the new sites and electricity will be provided as part of the relocation and resettlement packages for those who are entitled. Livelihood development activities require some construction in the areas of the resettlement sites and among other villages that are entitled to participate in the Community Livelihoods Improvement Plan (CLIP). Construction which will be carried out by works contractors will involve irrigation and other small infrastructure including, for example, bridges and wharves to facilitate water transport and movement between resettlement sites and land holdings. Some work, for example the preparation of terracing and new paddy fields will be carried out by resettlers. Resettlement site construction is due to start in the second half of 2011 and procurement for the works will start in the first half of 2011. Some goods procurement, for example of electricity distribution equipment, will also be required at this stage.

9. Livelihood development activities that involve supporting communities through education, training and awareness, providing advice, and supporting the development of microenterprises will be carried out by a combination of government outreach agencies such as the Provincial and District Departments of Agriculture and Rural Development, specialist NGOs with experience of delivering rural development support – of which there are a number active in the project area – and, where necessary, consultants. The livelihood development activities will be started as a pilot in 2011 and run for a year. Lessons learned will be incorporated into the full program which will start in 2012 and are scheduled to be complete before the start of reservoir impoundment scheduled in February 2015.

10. Supervision and monitoring of the impacts of resettlement and the effectiveness of the CLIP and Ethnic Minorities Development Plan will be the responsibility of the TSHPCo safeguards team, which will hire specialized consultants as required for the monitoring at mid-

term and completion. There will also be an independent monitoring consultant to review social impact, and local NGOs will be encouraged to participate in the monitoring process.

### ***Health Support***

11. The Public Health Action Plan (PHAP) is planned to cover a ten year period. The first five years, during the project lifetime, will address immediate project health impacts on resettlers and the wider population living in the project area. In the second half of the period it will adjust to health maintenance. Implementation will be overseen by a PHAP steering committee, with membership drawn from local government and TSHPCo, which will also coordinate with national programs, including those receiving other international support. The main responsibility for the implementation of the PHAP will lie with the District health services, while financing will be provided by TSHPCo and supervised by its Project Health Management Team (PHMT).

12. Responsibility for health education and awareness, diagnosis and detection, treatment and public health monitoring and surveillance will lie with the District Health Centers (DHCs) implemented through the Commune Health Centers (CHCs) and village health workers, with support from mass organizations such as the Women's and Youth Unions. Support for the DHCs for capacity building will be carried out by specialist consultants. The construction of the new CHC for Trung Ly will be carried out by contractors under supervision of TSHPCo; staff and equipment will be transferred from the existing CHC.

### ***Environment Management***

13. Much of the responsibility for implementing the Environment Management Plan (EMP) rests with the contractors responsible for the construction of the dam, access roads and bridges and transmission lines. The requirements for environment management will be included in bidding documents for works, and only bidders with previous experience of environment management will be qualified to carry out the contracts. The performance of the contractors will be monitored by the supervising engineer and also an independent monitoring consultant (IMC).

14. A number of environment management activities will be carried out by entities other than the main contractors during the lifetime of the project including: management of biodiversity and protected areas; reservoir clearing and salvage; community relations and safety; management of cultural resources; and additional studies. Support to the forest protection service to manage terrestrial biodiversity will be provided by capacity building consultants and training. Biomass clearance from the reservoir will be carried out by local communities, who will be allowed to keep the salvage for their own use or sale. Management of cultural resources will be the responsibility of TSHPCo, in which it will be supported by specialist service providers including the Vietnam Institute of Archaeology. The additional studies will be carried out by specialized locally and internationally experienced consultants.

### ***Capacity Building***

15. Individual consultants will be hired as advisors to work alongside the specialist teams in TSHPCo to provide a combination of experience and advice, while ensuring that front-line responsibility for program implementation rests with the staff of TSHPCo. The consultants will build the capacity of TSHPCo to supervise the implementation of the social and environment mitigation component especially during the period over which the company plans to increase the number of staff in its social, health and environment teams.

### ***Oversight and Participation***

16. Oversight of social and environment impact mitigation will be carried out at two levels. Independent monitoring consultants will review activities by both contractors and TSHPCo and report to independently to EVN and the Bank. Second, the Environment and Social Panel of Experts (PoE) will retain its oversight role. To ensure continued local community participation, a community relations office will be established and managed by dedicated staff in TSHPCo. Its role is discussed more in Annex 11.

### **Capacity Development and Scale-up**

17. The Capacity Development and Scale-up Component will be implemented by TSHPCo on behalf of EVN by assisting corporate level departments identify suitable candidate projects for preparation and then supporting the preparation process. It is usual in EVN that once a project has advanced sufficiently, normally at the start of preparation of the pre-feasibility study, the project will be assigned to a Project Management Board (PMB) to carry it through preparation and implementation and, in some cases to operation. In the event that the identified candidate project is assigned, the work would continue with the PMB; no legal changes would be required since the PMB would remain an entity within EVN.

18. Support to the preparation would be provided through specialized internationally-experienced consultants working with Vietnamese counterparts.

### **THE ROLE OF PROJECT PARTICIPANTS**

19. A chart setting out the relationships between each of the main project participants is shown in Figure A6.1. The role of each is described in more detail in the following paragraphs.

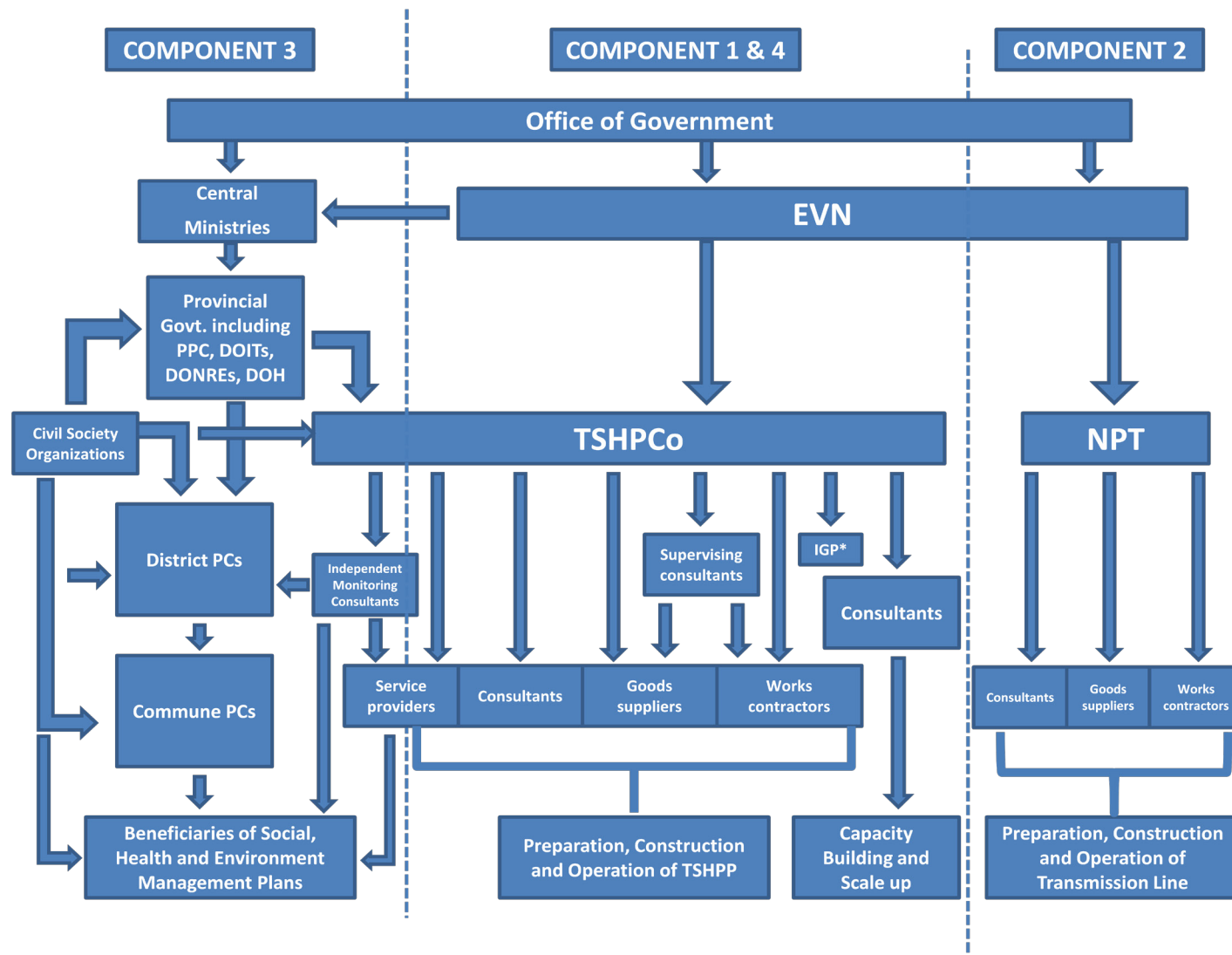
### **Government and Central Ministries**

20. *The Office of Government (OoG)*, the office of the Prime Minister has approved the project detailed outline as submitted by the project owner, EVN, through its line Ministry, MoIT and the Ministry of Planning and Investment (MPI). The Prime Minister has also approved the Resettlement Policy Framework for the overall project and for the transmission lines. With those approvals now in place, OoG has delegated further approvals and decisions to MoIT and EVN.

21. *State Bank of Vietnam (SBV)* will sign the financing agreement with IBRD, on behalf of the Government of Vietnam.

22. *Ministry of Finance (MoF)* will sign a subsidiary financing agreement with TSHPCo and NPT, and will charge an onlending fee to them.

**Figure A6.1: Organization of Main Project Participants**



\* IGP: Independent Grievance Panel (see Annex 11)



23. *Ministry of Industry and Trade* is responsible for approving the main project feasibility study. It has delegated subsequent approvals to EVN.

#### Provincial, District and Commune People's Committees

24. The *Provincial People's Committees (PPCs)* of Hoa Binh, Son La and Thanh Hoa Provinces are each responsible for reviewing and endorsing the RLDP in so far as it applies within the territory of the province. They will approve the Resettlement Plan or assign District People's Committees (DPCs) under them to approve it. The Provincial Departments of Natural Resources and Environment (DoNREs) are responsible for oversight of environmental matters in the territories of the province. Provincial Departments of Health (DoHs) will participate in the steering of the PHAP. Provincial Departments of Agriculture and Development (DARDs) will participate in extension and outreach elements of the CLIP. DoNREs and DARDs will work with TSHPMB to implement the studies on downstream impacts, intact rivers and cumulative impacts. Provinces are also responsible for water resource management within their territories, but have no formal coordination mechanism with other provinces at the river basin level.

25. The *District People's Committees (DPCs)* of Mai Chau, Moc Chau, Quan Hoa and Muong Lat Districts are responsible for the implementation of the ongoing resettlement compensation, in coordination with TSHPMB and with TSHPCo after it has been formed. Their units responsible for health, agriculture, and natural resources and environment will be responsible for implementation of government programs in those sectors and will work with TSHPCo to ensure coordinated delivery of government programs and project activities. DPCs and their agencies will be beneficiaries of capacity building and of some elements of investment.

26. The *Commune People's Committees (CPCs)* with the participation of village, ethnic minorities and household representatives, will establish working groups to assist implementation of elements of the RLDP and EMP, including for example the CLIPs and EMDP and the clearance and salvage of biomass from the reservoir area. CPCs will also organize participation of households and representatives in monitoring of the project and will be one of the channels by which complaints and grievances will be channeled to TSHPCo.

#### Vietnam Electricity Group

27. *Vietnam Electricity* is the project owner. It takes responsibility for ensuring the entire project is implemented according to both government and World Bank requirements. EVN has approved the project detailed design, and will ensure that sufficient resources are allocated to implement the project, including the provision of counterpart funding and adequate staffing. EVN has created THSPCo as a One-member Company (OMC) from the former TSHPMB. TSHPCo will, for the time being, remain a wholly owned subsidiary of EVN into which all the assets of Trung Son Hydropower Plant (TSHPP) will be placed. Staff of TSHPMB have been transferred to TSHPCo.

28. The creation of TSHPCo has several advantages, particularly in the light of the restructuring of EVN, which is required in response to the reforms of the power sector and the creation of the Vietnam Competitive Generation Market. It is expected that EVN will have to give up ownership of all its generation assets except those which are classified as strategic or multipurpose, which are mainly the larger hydropower plant in Vietnam. These generation assets are expected to be moved to one or more generation companies; TSHPP can thus be transferred by a relatively simple change of TSHPCo ownership. This has advantages in terms

of transparency by retaining an arms' length relationship between EVN and TSHPCo. It also permits covenants on performance of TSHPCo to be established, which can be transferred to the new owner. Making the transfer before TSHPP has been constructed does make TSHPCo more risky as a project entity since it must bear construction and completion risks, but these are mitigated by having in place memorandum of understanding now signed, that agrees to put in place a power purchase agreement between TSHPCo and the single buyer before the start of operation.

29. Until EVN gives up ownership, certain of its corporate functions, represented by the Appraisal, Planning, Procurement and Finance and Accounting Departments retain oversight of TSHPCo. The Procurement Department will supervise procurement undertaken by TSHPCo and prior review all bidding documents, bid evaluations and proposals for contract award. EVN's Investment and Appraisal Departments will, initially, be responsible for the implementation of the Capacity Building and Scale-up Component, but responsibility may be shared with other departments when a specific activity is identified and preparation has been sufficiently advanced. This oversight will transfer to the corporate functions of the new owner of TSHPCo.

30. *TSHPCo* is the implementing entity with day to day responsibility for preparation, planning and execution of the main dam and ancillary works including construction of the power lines and substations up to 110kV, and the access road and bridges. It will be responsible for:

- The timely procurement, contracting and execution of contracts for the physical works, supply of goods and associated consultant services.
- The implementation of the Environment Management Plan (EMP) and its related subsidiary plans; the RLDP; the PHAP; and the EMP for the access roads in compliance with the commitments set out in them. It will also be responsible for the preparation and implementation of the RP, EMDP and EMP for the power lines to supply the construction site in compliance with the requirements set out in the frameworks agreed for their preparation
- Communication, consultations and community relations with people affected by the project, other stakeholders and the general public.
- Financial management, including responsibility for its Designated Account.
- Project management, monitoring progress and reporting regularly to EVN and the Bank.

31. *National Power Transmission Corporation.* The National Power Transmission Corporation (NPT), a wholly owned one-member company subsidiary of EVN, through its *Northern Power Projects Management Board* (NPPMB) will be responsible for the design, construction, commissioning and operation of the 65km 220kV transmission line to evacuate power from the hydropower plant into the national transmission network. It will prepare and implement the RP, EMDP and EMP for the transmission lines, in compliance with the requirements set out in the frameworks agreed for their preparation.

32. *Contractors, Goods Suppliers and Consultants* will be hired by TSHPCo and NPPMB to implement specific activities to be financed. They include works contractors, goods suppliers, consultants to supervise contractors and suppliers, service providers to deliver aspects of the social programs, independent monitoring consultants for the social, health and environment parts of the project.

## Independent Advisors

33. Both the Environment and Social Panel of Experts (PoE) and the Dam Safety Review Panel (DSRP) will continue to function during the project construction phase. They will both have their formal advisory roles on environment and social and dam safety safeguards. In addition, the PoE will be involved in the independent grievance process and the DSRP will provide broader engineering advice as requested by TSHPCo and will become a Project Technical Advisory Panel (PTAP). The composition of both PoE and PTAP may be adjusted during the project to accommodate these additional tasks but will not be changed in a way that would compromise their formal duties which are discussed in greater detail in Annex 10.

## Civil Society

34. Although civil society organizations (CSOs) have no formal role in implementing of the project, several, including mass organizations (the Women's Union and Youth Union), Vietnam Union of Science and Technology Associations (VUSTA, an umbrella NGO organization) and a number of individual NGOs with interests in social development and environment protection have participated extensively during preparation. Representatives of NGOs have participated as observers during field consultations with those affected by the project and provided feedback to TSHPCo. That role is expected to continue during implementation, and TSHPCo will engage with CSOs through its community relations activities.

## PROJECT TIMETABLE

35. A project timetable has been prepared by TSHPCo which is summarized in Figure A6.2. Key milestones in the project as currently scheduled are as follow:

	Start	Finish
Resettlement compensation for road	February, 2009	December, 2010
Access road and bridge construction	January, 2011	February 2013
Reservoir area compensation	December, 2010	February, 2012
CLIP activities	January, 2011	May, 2016
River diversion	June, 2012	
Construction of main dam and auxiliaries	June, 2012	September 2016
Construction of transmission line	March, 2014	October 2016
Impoundment of reservoir	September, 2016	
First turbine operation		November, 2016
Full operation		May, 2017

## SUPERVISION

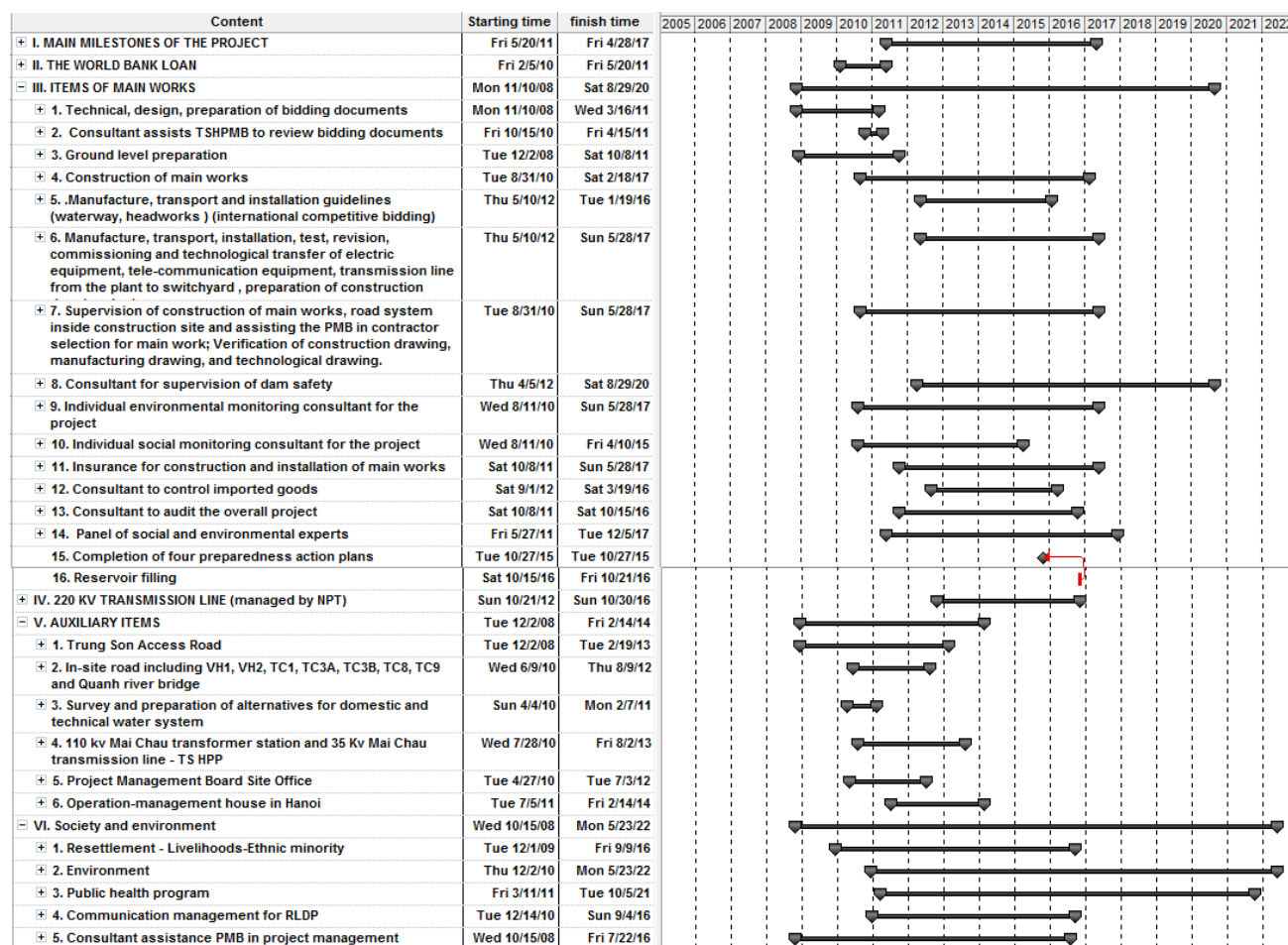
36. The main feature of the implementation strategy is a continuation of the successful project preparation approach evolved over the past three years or so. The main features of this are to continue to build stakeholder ownership, especially EVN and TSHPCo, for: improved standards in environment, social, and dam safety aspects of project design and implementation; greater participation from project affected people; and better project management in all its manifestations, most notably procurement, fiduciary and technical.

37. The key risk TSHPCo faces is the transition from project preparation to project implementation which will go hand in hand with its change from a dependent unit of EVN to an incorporated OMC. It is increasing the number of staff significantly. EVN, which has extensive experience of management of its own and World Bank projects will maintain close oversight of

key aspects of project implementation, particularly procurement and financial management. Risks with the other implementing agencies – NPT and NPPMB are lower as they both have direct and extensive experience of Bank projects and so a lower level of implementation support will be required.

38. Residual project management risks remain: project and contract management skills are generally weak in Vietnam and a rapidly-expanding project is likely to encounter its fair share of difficulties. Internationally-experienced supervision contractors have a role, though in turn their contracts will need close management. Funds for individual advisors have been built into the project budget, and these advisors will be recruited to work alongside TSHPCo staff as needed, in a way similar to that adopted during preparation and in other projects that have been implemented in the power sector in Vietnam. Bank staff will remain closely engaged throughout, assisted by a large proportion of the task team being based in the Hanoi office.

**Figure A6.2: Project Timetable**



## Implementation Support Plan

39. The strategy for implementation support has been developed based on the design of the project and its risk profile. It aims at providing sufficient technical support to TSHPCo, the

implementing agency, ensuring fiduciary compliance with World Bank guidelines, and adequately carrying out all risk mitigation measures identified in the risk analysis.

40. Bank staff based in the Hanoi office are able to provide guidance on most aspects of project implementation from a technical, fiduciary and safeguards perspective in real time. Additional training and capacity building will be needed to ensure that appropriate knowledge is made available to members of TSHPCo to enable them to carry out their jobs. Given the uneven nature of recruitment, this is likely to require repeat training sessions.

### ***Technical***

41. The task team will work closely with TSHPCo and its main design and supervision consultants, to ensure that (a) the design and construction of the dam and ancillaries meet industry and international standards, and (b) all equipment and supplies procured are of good quality.

42. Bank staff expert in hydropower, supplemented by international experts will review and provide input to the detailed engineering design, technical specifications and project management for the dam and ancillaries constructed under the project. The experts will also participate in project supervision and field visits during the construction stage to monitor and inspect the works performed under the major contracts. The hydropower engineer and, if necessary, power engineer will also be responsible for technical review of bid documents and evaluation reports. In addition to day to day interactions, implementation support missions will be carried out semi-annually to review progress during the construction phase of the project (approximately 50 months).

### ***Environment and Social Safeguards***

43. The task team will supervise the implementation of the agreed EMP for the road, the EMP and RLDP for the main reservoir area and the EMP, RP and EMDP for the power lines, both to ensure compliance with World Bank policies and to maximise the development opportunities provided by the project. The elements of the RLDP that will require particularly close supervision are the Community Livelihoods Improvement Plan (CLIP) and the communications, community relations and grievance panel. The CLIP will be supervised by Bank staff experienced in community and rural development while the communications and community relations activities will be supervised by staff from the Hanoi office with experience of working with local people and NGOs in Vietnam.

44. The supervision of the RP will be carried out by a combination of international and local staff with experience of involuntary resettlement in Vietnam and worldwide. It will require close and often day to day interaction with both TSHPCo and District People's Committees; key to success will be ensuring close collaboration between the two and so primary responsibility will rest with staff based in the Hanoi office.

### ***Fiduciary: Procurement, Financial Management, Governance and Accountability***

45. Much of the investment component of the project will be implemented through three main contracts, one for construction, and one for supply and installation of the electromechanical equipment and one for supervising engineers for the other two contracts. In addition a number of other contracts of varying sizes and scope will cover other construction, goods supply and consulting work. TSHPCo will hire individual consultants to assist them in procurement and the supervising engineers will help in contract management. The Bank will provide support to ensure timely review, issue and evaluation of key bid documents. Support, already under way,

has included necessary training workshops for staff responsible for procurement and particularly for those responsible for leading the major bidding tasks. Other procurement support would be through consultant services especially those associated with the capacity building component. Supervision of project financial management will be performed applying a risk-based approach. The supervision will review the project's financial management system, including but not limited to accounting, reporting and internal controls.

46. Supervision of project financial management and procurement will be performed on a risk-based approach. During implementation and in coordination with the task team, the procurement and FM specialists will conduct reviews at least annually, including reviewing of reports required by the Project Agreement, checking for compliance with agreed procurement and FM procedures, indentifying potential capacity gaps, and evaluating adequacy of documentation and record keeping arrangements. Training will be provided to by country office-based World Bank procurement and financial management (FM) specialists as needed.

47. The task team will monitor the implementation of the agreed action items detailed in the Governance and Accountability Framework (GAF) and provide guidance in resolving any issues indentified during supervision. TSHPCo's performance against the action plan, agreed by both the World Bank will serve as the guide during project implementation. The task team will undertake annual workshops to review performance and identify areas where the GAF has been effective and where improvements could be introduced.

#### ***Financial Review of TSHPCo and NPT***

48. Financial reviews of TSHPCo to ensure compliance with the financial performance covenants will be undertaken by the task team's financial analyst. Financial performance of NPT, which is covenanted under a number of other Bank-financed projects, will be kept in view.

#### ***Communications***

49. Training in communications for TSHPCo is programmed in the early stages of the project's implementation. In addition to supporting the an effective program of communications by TSHPCo, which is discussed in greater detail in Annex 11, the task team will also ensure adequate communications on behalf of the Bank. External communications experts from within the Bank and specialist consultants hired by the Bank will undertake these tasks. In addition to a structured communications activities, reactive communications are also expected to be needed.

#### **Implementation Support Budget**

50. The project implementation support budget is estimated at \$175,000 - \$200,000 per year, broken down as shown in Table A6.1.

**Table A6.1: Supervision Budget Plan**

<b>Time</b>	<b>Focus</b>	<b>Skills Needed</b>	<b>Resource Estimate</b>	<b>Comments</b>
At approval	Access road and bridges contracts start Prepare for pilot CLIPs Main works contracts and supervision consultant procurement Start of implementation including main construction site clearance.	Technical: roads and bridges, hydropower, rural livelihoods; Fiduciary: procurement Safeguards: involuntary resettlement, Communications/consultations	\$50-75,000	Bank role will also be to continue to support TSHPMB as it transitions from preparation to implementation.
First twelve months	Prompt signing and effectiveness Procurement of goods and works CLIP pilot implementation Preparation for resettlement compensation	Technical: hydropower, rural livelihoods, ethnic minorities; Safeguards: environment and social; especially involuntary resettlement Fiduciary: procurement Communications	\$120,000	
12-60 months	Implementation of main project contracts Implementation of capacity building and scale up components, and dam safety components	Technical: hydropower (including dam safety), other power, rural livelihoods, ethnic minorities, environment, monitoring and evaluation; Safeguards: environment, social and dam safety, communications and consultation and grievance handling.; Fiduciary: procurement and financial management	\$180,000/year	
Mid term	Progress reporting on physical works, monitoring and evaluation of livelihoods restoration	Technical: hydropower, rural livelihoods; environment; monitoring and evaluation; Safeguards: environment and social; Fiduciary: procurement	\$30,000	
Closing	Completion of contracting, monitoring of impacts	Technical: monitoring and evaluation supported by skills in hydropower rural livelihoods, ethnic minorities, environment; Safeguards: environment, social, dam safety; Fiduciary: financial management	\$100,000	

## **Annex 7: Financial Management and Disbursement Arrangements**

### **VIETNAM: VN-Trung Son Hydropower Project**

1. An assessment of the financial management (FM) arrangements for the proposed Project was conducted based on the Financial Management Manual issued by the FM Sector Board on March 1, 2010. The assessment concluded that the project meets the minimum Bank financial management requirements, as stipulated in OP/BP 10.02. The proposed and assessed implementing entity of the Project is Trung Son Hydropower Project Management Board (TSHPMB formed by EVN) which became a One-member Company, Trung Son Hydropower Company (TSHPCo), before negotiations. The financial management function has been strengthened by preparing detailed job descriptions for each position and detailed guidance on financial reporting, funds flow and contract management.
2. Financial management risk is the risk that World Bank loan proceeds will not be used for the purposes intended and is a combination of country, sector, and project-specific risk factors. A “Substantial” FM risk rating is assigned to the project, before and after mitigation measures, at the appraisal stage.
3. Vietnam Electricity is the owner of the project and will be responsible for overall project management and oversight. It has been managing the Bank’s projects for several years with satisfactory financial management rating. TSHPCo will be responsible for overall coordination, quality assurance, procurement, financial management, monitoring and reporting, and day-to-day supervision of project activities. TSHPMB functioned from 2007 and managed the Policy and Human Resources Development (PHRD) Grant for preparation of this Project. The financial management function of TSHPMB had been equipped with adequate personnel and accounting systems and was transferred *en bloc* to TSHPCo. EVN departments, and National Power Transmission Corporation (NPT) which will be responsible for some components of the Project, are implementing entities of the Bank’s ongoing projects with overall Satisfactory ratings, including for financial management.
4. Two Designated Accounts (DAs) will be opened and maintained in US dollars at commercial banks with terms and conditions acceptable to the Bank, for i) TSHPCo, and ii) NPT.
5. Traditional disbursement methods (with reporting method using SOE/ Summary Sheet) will be applied. The ceiling of the Designated Accounts is subject to adjustment quarterly based on the 6 months rolling funds forecast prepared by the PMUs.
6. The Project Financial Statements will be audited by independent auditors acceptable to the Bank in accordance with TOR acceptable to the Bank. The cost of the audit will be funded by the Project. Besides the Project financial statements, the financial statements of TSHPCo and NPT will be prepared according to International Financial Reporting Standards (IFRS) and submitted to the Bank annually. In addition, quarterly Interim Financial Reports (IFRs) will be prepared by the PMUs and submitted to the Bank, with format and contents acceptable to the Bank. All audited financial statements, including the entity financial statements are to be published according to the Bank’s information disclosure policy.

#### **COUNTRY ISSUES**

7. The 2007 CFAA assessed the financial management risk to proper use, control and reporting of funds that are managed through the Vietnam public financial management systems



is Moderate. The public accounting system and financial management arrangements are well-documented and regulated, but financial management risks arise from gaps and overlaps in the systems, and more particularly risks arise from weaknesses in implementation and compliance gaps. The CFAA found that key challenges in the public financial management (PFM) systems remain in the areas of: (i) expanding budget coverage in line with internationally accepted norms; (ii) implementing the new government Chart of Accounts and the Treasury and Budget Management Information System with strengthened internal controls (including internal audit) and streamlined business processes; (iii) implementing more comprehensive accounting and timely financial reporting based on internationally recognized standards and practices; and (iv) expanding audit coverage and quality, and legislative oversight of PFM. Strengthening strategies and implementing action plans to enhance capacity and accountability for public financial management in line ministries and agencies at all levels of government is a priority area for action.

8. Many developments and reforms in public financial management such as streamlining of business processes, strengthening of expenditure and revenue internal controls, and enhancing monitoring and oversight of budget development and execution are in progress, and a gradual strengthening of PFM is taking place. The implementation of the 2004 Public Expenditure Review – Integrated Fiduciary Assessment (PER-IFA) and 2007 Country Financial Accountability Assessment (CFAA) recommendations are being supported by the Poverty Reduction Support Credit (PRSC) series and grant funds. The PFM reforms are having a positive impact on the overall PFM environment, but specific improvements in systems have not yet led to full integration of ODA into the overall PFM framework. The priority is for substantive implementation of the improvements and enhancements that have been and are being progressively introduced through legislative reforms and development work in recent years.

#### RISK ASSESSMENT AND MITIGATION

9. Trung Son Hydropower Project will be managed by TSHPCo. The financial management function of TSHPCo is staffed with adequate personnel with experience working with the Bank on the PHRD Grant for preparation of the Project.

10. The inherent risk to the project from the financial environment is assessed to be **Substantial** before and after mitigation. The project specific control risk taking into account the risk mitigation measures that are to be implemented for the project is assessed as **Substantial**. Table A7.1 assesses project financial management risk on inherent and control risk dimensions.

**Table A7.1: Trung Son Hydropower Project Risk Assessment**

<b>Risk</b>	<b>Risk Rating</b>	<b>Risk Mitigation Measures Incorporated into Project Design</b>	<b>Residual Risk</b>
<b>Inherent Risk</b>			
Country level: Overall Fiscal Environment	Moderate	Capacity building in Medium term Expenditure Framework (MTEF) and budgeting, implementation and monitoring, commitment control and debt management;	Moderate

<b>Risk</b>	<b>Risk Rating</b>	<b>Risk Mitigation Measures Incorporated into Project Design</b>	<b>Residual Risk</b>
Entity and Project level: Funds may not be used efficiently and economically and for purposes intended	Substantial	i. Annual project financial statements audited by independent auditor acceptable to the bank; ii. expenditure verification by Vietnam Development Bank; iii. financial management manual (including contract and consultant management, expenditures authorization, fund and asset management, segregation of duties);	Substantial
Entity and Project level: the PMUs may not have necessary capacity to implement the project	Substantial	i) TOR and CVs of key financial management positions reviewed by the Bank; ii) Training provided to TSHPMB (TSHPCo)	Substantial
<b>Overall Inherent Risk</b>	<b>Substantial</b>		<b>Substantial</b>
<b>Control Risk</b>			
1. Budgeting	Substantial	i) Operational budget and procurement plan to be linked with financial budget which should be integrated in the financial management software; ii) Variances analysis should be done on a quarterly financial monitoring reports.	Substantial
2. Funds Flow	Substantial	Funds will flows directly from the Bank to the designated accounts maintained at a commercial bank acceptable to Bank whose signatories are PMUs' management.	Moderate
3. Staffing	Substantial	i) Detailed job description for each FM position need to be clarified and approved by the Bank; ii) Financial management staff need to receive further training on financial reporting, fund flow and contract management	Substantial
4. Internal Control	Substantial	Further detailed guidelines on financial reporting, fund flow and contract management need to be issued for TSHPMB (TSHPCo).	Substantial
5. External Audit	Substantial	Project Financial Statements will be audited by independent auditors with TORs acceptable by the Bank using International Standards on Auditing. TSHPCo and NPT entity financial statements under IFRS will be audited Independent Auditors with TORs acceptable by the Bank using International Standards on Auditing.	Moderate
6. Reporting & Monitoring	Substantial	Financial Reporting forms and templates are set up in the detailed guidelines on financial reporting. The interim financial reports submitted quarterly to the Bank for review.	Substantial
7. Information Systems	Moderate	The current accounting software of the existing PMUs (provided by EVN) will continue to serve the Project	Moderate
<b>Overall Control Risk</b>	<b>Substantial</b>		<b>Substantial</b>

## Strengths and Weaknesses

### ***Strengths***

11. The following strengths are assessed:

- The project owner, EVN, has implemented several IDA projects with satisfactory performance, including financial management performance;
- TSHPCo, together with its financial management function has experience with the Bank's PHRD Grant;
- The implementing agency of the component not implemented by TSHPCo, NPT, is managing ongoing Bank projects satisfactorily;
- The current accounting software used by the PMUs (FMIS), which has been tested and proved in other Bank's projects executed by EVN, will continue to serve the Project.

### ***Weaknesses***

12. The following weaknesses are assessed:

- TSHPMB financial management unit had high staff turnover in recent years, with limited handover on both its work and the Bank's requirements and practices;
- Internal controls are not documented in a detailed and comprehensive manner in a financial management manual.

## CONDITIONALITY AND FM ACTION PLAN

13. An action plan, agreed with TSHPMB managers was completed by negotiations and is set out in Table A7.2.

**Table A7.2: Action Plan for TSHPMB**

Action	Responsibility	Status
<p>i) <u>Organizational structure of the FM unit and TOR and CV of each position</u></p> <p>Organizational structure of the financial management unit and job description (TOR) of each financial management position to be drafted by the TSHPMB and approved by the Bank.</p> <p>For staff replacement in future, CV of the candidate needs to be approved by the Bank before appointment.</p>	TSHPMB and Bank	Completed
<p>ii) <u>Financial management detailed guidance</u></p> <p>Detailed guidance on financial reporting, fund flow and contract management need to be prepared by TSHPMB and approved by the Bank.</p> <p>Financial management staff to be trained in the guidance.</p>	TSHPMB and Bank	Completed

## IMPLEMENTATION ARRANGEMENTS

14. EVN is the owner of the project and will be responsible for overall project implementation and management. EVN has been managing the Bank's projects for several years satisfactorily. TSHPCo will be responsible for overall coordination, quality assurance, procurement, financial management, monitoring and reporting, and day-to-day supervision of

project activities. Its predecessor, TSHPMB managed the PHRD Grant for preparation of the project from 2007 until its closing in 2010. Other components are implemented by EVN and NPT which are both implementing agencies of satisfactory ongoing Bank projects.

#### Retroactive Financing

15. Advanced contracting is now under way for works related to the access road and bridges, and for consultant services associated with these works contracts. Other advanced contracting may be started before project effectiveness. Retroactive financing of these contracts is proposed, in an amount not expected to exceed \$20 million.

#### Staffing

16. The Financial and Accounting Units of the PMUs are responsible for the financial management of this project. The Unit of TSHPCo comprises one Chief Accountant, one Deputy Chief Accountant, two accountants and one cashier.

#### Budgeting

17. For the PHRD project managed by TSHPMB, the annual disbursement plan, which was linked with the Project procurement plan, was prepared by TSHPMB and approved by EVN. Comparison between actual and budgeted figures was reported in interim financial reports, but not with detailed analysis to establish necessary actions. The IFRs of the proposed Project will need to contain such detailed variance analysis.

#### Accounting

18. The accounting system used in the TSHPCo is the Accounting System for Enterprise, in accordance with Decision 15/2006/QD-BTC, which applies to corporate financial reporting of EVN. The current chart of accounts of the project management units will need to be updated to meet the Bank's financial management requirements of the report by project components, activities and disbursement categories.

19. An accounting system and procedures such as retention of documents, system records and access to such records have been established. Records of fixed assets are in place.

20. The accounting software used by TSHPCo (FMIS) which has been tested and proved in other Bank's projects executed by EVN will continue to serve the Project.

#### Internal Controls

21. The Directors of TSHPCo and NPT will be responsible for ensuring that an adequate internal control framework and internal controls are in place and operating.

22. The project's internal control system will include the key controls of (i) clearly defined financial management responsibilities and reporting structures; (ii) segregation of duties; (iii) defined and documented financial processes and procedures; (iv) regular timely reconciliations; (v) security and safeguarding of cash and assets; (vi) effective and efficient contract management; (vii) timely reporting, review and monitoring; (viii) timely remedial actions and follow up on financial issues, variances and audit findings; and (ix) proper documentation and retention of project financial records and documents.

23. The internal control procedures issued by EVN, which has been effective in other Bank's funded projects, will be applied for the Project.

24. TSHPCo needs further guidelines on financial reporting, fund flow and contract management. Those guidelines are prepared by TSHPCo and approved by the Bank.

#### SPECIFIC MEASURES TO REDUCE FRAUD AND CORRUPTION

25. To continue to strengthen the financial management arrangements for the project and to help further reduce the risk of fraud and corruption, during preparation particular emphasis has been put on the financial management arrangements in the following areas. Supervision will also focus on them:

- Clear FM responsibilities with avoidance of gaps and overlaps and maintenance of segregation of duties of FM personnel;
- Enhanced disclosure and transparency of financial information.

#### IMPACT OF PROCUREMENT ARRANGEMENTS

26. Procurement procedures for goods and consultant services will be in line with Bank Guidelines. This feature has been considered when designing Financial Management arrangement.

#### FUNDS FLOW AND DISBURSEMENT ARRANGEMENTS

27. The allocation of the loan proceeds is set out in Table A7.3

**Table A7.3: Allocation of Loan Proceeds**

<b>Expenditure Category</b>	<b>Amount of Loan Allocated (million US\$)</b>	<b>% of Expenditures to be Financed (inclusive of taxes)</b>
Goods, works, services, and training costs for dam and ancillary construction and for social and environment mitigation (Components 1 and 3).	302.225	100%
Goods, works and services for transmission line (Component 2).	23.950	100%
Goods, and services for capacity development and scale up (Component 4).	3.000	100%
Front-end Fee	0.825	100%
<b>TOTAL</b>	<b>330.000</b>	

#### Disbursement Methods

28. The project will use the following traditional disbursement methods:

- *Reimbursement* - The Bank may reimburse the borrower for expenditures eligible for financing pursuant to the Credit Agreement (“eligible expenditures”) that the borrower has pre-financed from its own resources;
- *Advance* - The Bank may advance loan proceeds into a designated account of the borrower to finance eligible expenditures as they are incurred and for which supporting documents will be provided at a later date;
- *Direct Payment* - The Bank may make payments, at the borrower’s request, directly to a third party (e.g., supplier, contractor, and consultant) for eligible expenditures;
- *Special Commitment*: The Bank may pay amounts to a third party for eligible expenditures under special commitments entered into, in writing, at the borrower’s request and on terms and conditions agreed between the Bank and the borrower.

29. The *Disbursement Deadline Date* will be four months after the Closing Date of the project.

30. *Reporting on Eligible Expenditures Paid from the Designated Accounts.* Withdrawal applications reporting eligible expenditures paid from the Designated Account will be submitted with the following documentation:

- Use of Statement of Expenditures (SOEs). For: (a) goods costing less than \$100,000 equivalent per contract; (b) works costing less than \$500,000 equivalent per contract; (c) for services of individual consultants costing less than \$50,000 equivalent per contract; (d) for services of consulting firms under contracts costing less than \$100,000 equivalent per contract; and (e) workshops, training and operating costs, withdrawals under the Credit Agreement will be made on the basis of SOEs. The related payment documents will be made available for the required audits, as well as to the Bank supervision missions upon request.
- Other Expenditures: All other expenditure above the SOEs thresholds will be submitted on the basis of full documentation which will include copies of receipts, supplier invoices, bills of lading, etc.

31. *Applications for direct payment* Contract and purchase records evidencing the eligible expenditures, e.g., copies of contracts, purchase orders, supplier invoices, and receipts will be submitted together with the withdrawal application setting out clear payment instructions. The minimum application value for direct payment requests will be set in the project disbursement letter.

32. *Applications for reimbursement:* Withdrawal applications reporting eligible expenditures for reimbursement of eligible expenditures will be submitted with the same documentation as required for reporting of eligible expenditures paid from the DA.

33. *Special Commitments:* The concerned commercial bank will provide its confirmation directly to the Bank that conditions for release of payments committed for withdrawal have been met.

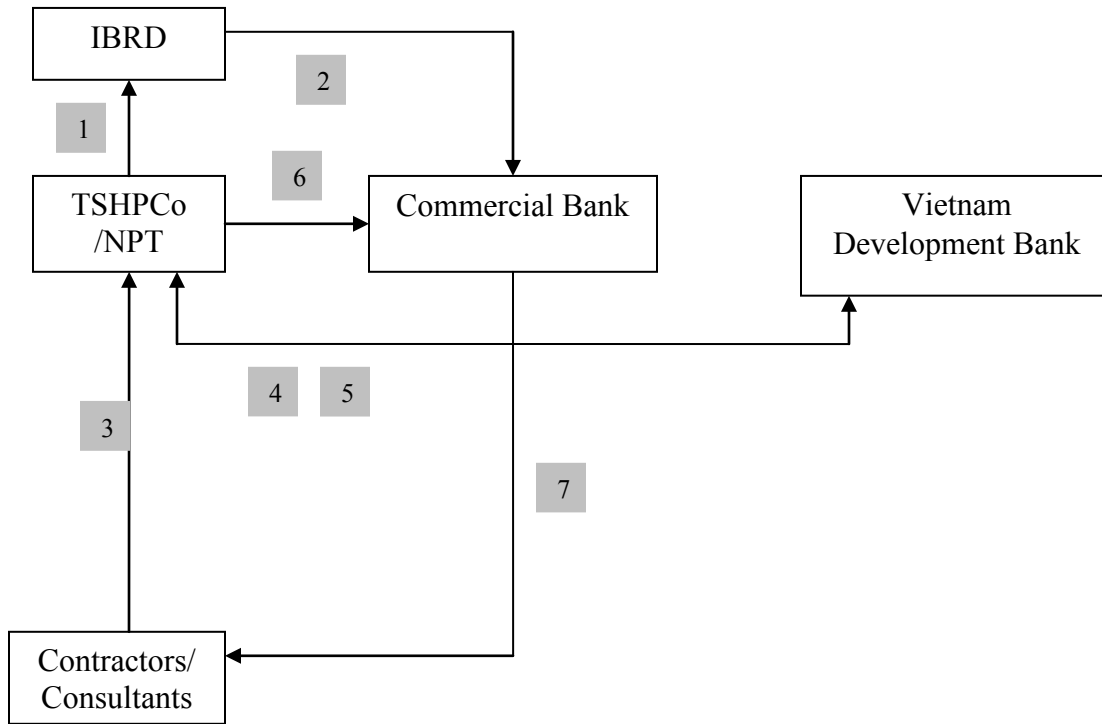
#### Designated Accounts

34. Two DAs for the IBRD funds will be opened in commercial banks with terms and conditions satisfactory to the Bank. The IBRD DAs will have an authorized allocation subject to quarterly adjustment based on the 6 month rolling funds forecast prepared by TSHPCo and NPT and approved by the Bank. Replenishment applications will be submitted monthly. For withdrawal outside the designated account (applications for direct payment, **reimbursement** or for issuance of special commitments), a minimum application value of 20 percent of the **balance** of the DA will be observed.

#### Funds flow to Contractors and Beneficiaries from the Designated Accounts

35. Funds flow arrangements for payments from the designated accounts to suppliers and beneficiaries, with the exception of compensation payments is proposed as in the Figure A7.1.

**Figure A7.1: Fund flows**



1. TSHPCo/NPT prepare the withdrawal application and send to IBRD
2. IBRD makes disbursement to the DA of PMUs at commercial bank
3. Contractors/consultants submit certificates, invoices to PMUs
4. TSHPCo/NPT review, certify and then submit to VDB
5. VDB verifies and sends back to TSHPCo/NPT
6. TSHPCo/NPT send the request for payments to the commercial bank
7. The commercial bank makes payment to the Contractors

## FINANCIAL REPORTING AND MONITORING

### Quarterly Interim Financial Reports (IFRs)

36. Quarterly Interim Financial Reports (IFRs) will be prepared by TSHPCo/NPT for monitoring of financial performance of the project in a format to be agreed between the representatives of the GoV and the Bank. TSHPCo and NPT has understood and agreed to use the Aligned Monitoring Tool (AMT) which is acceptable to the Bank and the Ministry of Planning and Investment.

37. The IFRs include the following forms (with the reference number as indicated in the AMT package):

*Financial reports (analyzing expenditures against budgets)*

- IFR1: Sources and Uses of Funds by component;
- Form 4: Disbursement by component and subcomponent;

- IFR3: Statement of Designated Account Reconciliation

*Contract monitoring reports*

- Form 12: Contract Progress; and
- 11 Forms (Form 7- Form 11): Reports on Procurement Monitoring.

38. The IFRs are not required to be audited.

**Audit Arrangements**

39. Financial statements for the project will be prepared by the TSHPCo/NPT at least annually. The project's annual financial statements will be audited in accordance with international auditing standards and in compliance with the independent auditing regulations of Vietnam. The auditor's reports will be made available to the Bank within six months of the close of the fiscal year.

40. An independent auditor acceptable to the Bank shall be appointed to conduct the audit of the annual financial statements of the project in accordance with TOR also acceptable to the Bank.

41. The auditor will be required to express an audit opinion covering the project financial statements, use of funds, SOEs and DA, which are prepared in accordance with International Public Sector Accounting Standards. A management letter addressing internal control weaknesses will also be provided by the auditor together with the audit report on the project financial statements.

42. TSHPCo and NPT entity financial statements prepared using IFRS audited by acceptable auditor project in accordance with Terms of Reference acceptable to the Bank shall be submitted to the Bank annually. All audited financial statements, including the entity financial statements are to be published according to the Bank's information disclosure policy.

**COUNTERPART FUNDING AND RETROACTIVE FINANCING**

43. Counterpart funding is arranged by EVN, which is assessed as having the capacity to mobilize the estimated remaining \$81.72 million needed for the project.

44. Advanced contracting for the construction of the roads and bridges and consultants to supervise the contractors is now under way and is expected to be complete before project approval. TSHPMB estimates that a total of \$20 million of retroactive financing will be required.

**SUPERVISION PLAN**

45. As the FM risk is assessed as Substantial, supervision of project financial management will be performed twice a year. The supervision will review the project's financial management system, including but not limited to operation of DAs, SOEs, internal controls, reporting and follow up of audit findings and mission's findings, and site visit. Financial management supervision will be conducted by the Bank's financial management specialists in conjunction with other task team members.



## **Annex 8: Procurement Arrangements**

### **VIETNAM: VN-Trung Son Hydropower Project**

#### **GENERAL**

1. Procurement for the proposed project would be carried out in accordance with the World Bank's "Guidelines: Procurement Under IBRD Loans and IDA Credits" dated May 2004 revised October 2006 and May 2010 (the Procurement Guidelines); and "Guidelines: Selection and Employment of Consultants by World Bank Borrowers" dated May 2004, revised October 2006 and May 2010 (the Consultant Guidelines) and the provisions stipulated in the Loan Agreement. A General Procurement Notice (GPN) for the project has been published. The various items under different expenditure categories are described in general below.
2. The procedure to be followed for National Competitive Bidding (NCB) shall be in accordance with the "open bidding" procedure described in Vietnam's Law on Procurement dated November, 2005 and its accompanying Decrees and Circulars subject to the modifications set out in the Attachment to Schedule 2 of the Financing Agreement, to ensure broad consistency with the Procurement Guidelines. In the case of a conflict between the Financing Agreement and any national laws or regulations, the Financing Agreement takes precedence.
3. The items to be procured under different expenditure categories are described below. For each contract to be financed by the Credit, the responsibility for procurement, the different procurement methods or consultant selection methods, the need for prequalification, estimated costs, prior review requirements, and time frame will be agreed between the Borrower and the Bank project team in the Procurement Plan. The Procurement Plan will be updated at least annually or as required to reflect the actual project implementation needs and improvements in institutional capacity.

#### **Procurement of Works**

4. Works to be procured under this project are estimated to cost \$185 million equivalent of which the IBRD Loan will finance \$178 million. They will include: construction of the main dam and appurtenant structures, roads, other infrastructure such as water and power supply and sanitation facilities, borrow pits, quarries and workers' camp within the project site; the access road and bridges; resettlement sites and associated infrastructure including power and water supply and roads; the transmission line to evacuate power from the site; a hydrological and water quality measurement station at the reservoir tail and below the dam and a commune health center. Procurement will use the Bank's most up to date Standard Bidding Documents (SBD) for the applicable Guidelines for all international competitive bidding (ICB) and the Sample Bidding Documents for NCB for procurement of works which have been agreed with the Borrower.
5. Advanced contracting is under way for the access road and bridges in two separate packages. Prequalification for the works contract for the construction of the main dam and appurtenant structures and will include the borrow pits and quarries, workers camp and site infrastructure and installation of the hydraulic-mechanical equipment is now under way. A separate contract will be procured for the construction of the roads within the project site which may, depending on project scheduling, also be subject to advanced contracting. About four contracts will be procured for the construction of the resettlement sites and associated infrastructure.

6. The preferred method for the procurement of works is ICB, and contracts for works will to the extent possible be packaged into items worth \$3 million or more. Works of a general nature estimated to cost between \$100,000 and \$3 million that are within the capacity of local contractors may be procured using NCB. Small works contracts of a simple nature estimated to cost less than \$100,000 may be procured using shopping. Direct Contracting may be used with the agreement of the Bank, for contracts meeting the provisions of Paragraph 3.6 of the Procurement Guidelines.

#### Procurement of Goods

7. Goods to be procured under this project are estimated to cost \$122 million equivalent, of which the IBRD Loan will finance \$119 million. They will include: supply and installation of the electro-mechanical equipment (hydro turbines, generators, control equipment and auxiliaries); the hydraulic-mechanical equipment and would be procured using the Plant and Equipment Supply and Installation SBDs. Power transformers, substation equipment, control and protection equipment, insulators, conductors, steel towers, hydrometeorological and water quality measurement equipment; other environmental protection and measurement equipment; medical supplies and equipment; and office materials and equipment will be procured using the Goods Supply SBDs. The procurement methods chosen are in line with industry practice, and match the strong engineering and technical skills available in Vietnam and are expected to improve both economy and efficiency in the procurement process.

8. The preferred method for the procurement of goods is ICB and items would to the extent possible be packaged into contracts worth US\$300,000 or more. Goods which are available in the country (at competitive prices) estimated to cost between US\$50,000 and US\$300,000 may be procured using NCB procedures. Shopping may be used for procurement of readily available off-the-shelf goods estimated to cost less than US\$50,000. Direct Contracting may be used with the agreement of the Bank, for contracts meeting the provisions of Paragraph 3.6 of the Procurement Guidelines.

#### Selection of Consultants

9. A total of \$41 million of consultant services are estimated to be required for the project, of which the IBRD loan will finance \$19 million. Consulting services to be financed include supervision of the construction of the main works, the access road and bridges and the transmission lines; supervision of manufacturing and inspection of the goods to be supplied and installed; and independent monitoring of social and environment management under the main works contracts covering the dam and appurtenant structures, roads and bridges and transmission lines. Consultants will be hired to support implementation of social impact management activities, including to prepare, implement and monitor resettlement plans, community livelihoods improvement plans (CLIPs) and the ethnic minorities development plan and to deliver related training and capacity building. Health monitoring and surveillance and capacity building in the health sector will also require consultant services. Studies, capacity building and training to be carried out under the environment management subcomponent, scale up and dam safety components will be carried out by consultants.

10. Advance selection of engineering consultants to supervise the construction of the access road and bridges is now under way, using Quality and Cost Based Selection (QCBS). Selection methods which will encourage consultants with international experience will be preferred. Consultants for assignments estimated to cost \$100,000 or more will be selected using either

QCBS or Quality Based Selection (QBS). Consultant services estimated to cost less than \$100,000 may use Selection Based on Consultants' Qualifications (CQS). Single Source Selection may be used for assignments that meet the requirements of paragraphs 3.9 – 3.13 of the Consultant Guidelines. Individual consultants will be selected subject to the provisions of Section V of the Consultant Guidelines. Short lists of consultants for services estimated to cost less than \$200,000 equivalent per contract may be composed entirely of national consultants in accordance with paragraph 2.7 of the Consultant Guidelines.

#### Operating Costs

11. Operating costs for the community relations office, will be financed from the project budget and will be subject to the presentation of Statements of Expenditure (SoEs). They may include rent, transport, training and assistance to project stakeholders and will be procured using administrative procedures established by TSHPCo acceptable to the Bank.

#### Other Methods of Procurement

##### ***Community Participation***

12. Some aspects of physical works, are to be undertaken by the community, as part of ensuring its participation in the project. These tasks are closely linked to the livelihood restoration activities supported by the CLIPs. Communities have the capacity to clear trees and other biomass and salvage it for sale or own use from areas where construction will take place, the reservoir area, resettlement sites and new agricultural plots. They also have the capacity to undertake leveling work for terracing of fields and the preparation of irrigation works. The procurement procedures, specifications and contract packaging are established in procedures prepared by TSHPMB which have been reviewed and found acceptable to the Bank broadly following paragraph 3.17 of the Procurement Guidelines. Some procurement by the main works contractor is expected to follow community procurement methods, and will also be required to follow procedures acceptable to the Bank. These will be detailed in the POM.

##### ***Hiring of NGOs and Non-commercial Other Service Providers***

13. The implementation of the CLIPs, the ethnic minorities development plans, and certain aspects of the health and environment management plans will require highly specialized knowledge and skills. The activities to be undertaken will be a hybrid of consulting services, non-consulting or technical service provision and supply of materials with no single one of these predominating. In keeping with the adaptive management principles of the project, the activities to be undertaken may vary over the duration of the program. The skills needed to undertake this kind of task are not normally found in commercial consulting firms or other goods or service providers. Potential providers include NGOs, State-owned universities, technical centers, and government research institutions. For each proposed activity, TSHPCo will formulate an outline of the activity and a plan for soliciting providers which will be subject to review by the Bank and may follow in addition to the methods already indicated paras. 3.15, 3.16, and 3.21, of the Consultant Guidelines.

##### ***Training Costs***

14. Costs arising for training, seminars, workshops, participation in study tours and other capacity building activities will be financed under the project. Each year or as required periodically, TSHPCo will prepare and submit a learning plan for review by the Bank. The program will provide details of the individual learning events including: objectives of the event, the number/level of the target group, the estimated cost, the location of the program, the duration

of the event and other relevant details. Before individual events are carried out, the Bank will review the cost estimate and plan for the activity.

#### Summary of Procurement Methods

15. Procurement methods and prior review thresholds are summarized in Table A8.1

**Table A8.1: Procurement Methods and Prior Review Thresholds**

Procurement Method		Estimated Contract Value	Prior Review Thresholds
Works:	ICB	≥\$3 million	All contracts
	NCB	<\$3 million	First contract, all contracts above \$300,000
	Shopping	<\$100,000	First contract
	Direct Contracting	Any value	All contracts
	Community participation	Any value	All contracts
Goods:	ICB	≥\$300,000	All contracts
	NCB	<\$300,000	First contract, all contracts above \$100,000
	Shopping	<\$50,000	First contract. Maximum aggregate of \$500,000
	Direct Contracting	Any value	All contracts
Consulting services:	QCBS/QBS	≥\$200,000	All contracts above \$100,000
	CQS	<\$200,000	All contracts above \$100,000
	Single Source Selection	Requirements set out in paragraphs 3.9 – 3.13 of the Consultant Guidelines	All contracts
	Individuals	Requirements set out in Section V of the Consultant Guidelines	All contracts above \$50,000

#### ASSESSMENT OF THE AGENCIES' CAPACITY TO IMPLEMENT PROCUREMENT

16. Procurement activities for Components 1 and 3 will be carried out by TSHPMB until it is incorporated and becomes TSHPCo. Staff will transfer from TSHPMB to TSHPCo and the same systems maintained and therefore its capacity will be unchanged. Both are headed by a Director who manages through the heads of five Departments: Economic and Planning; Technical; Social and Environment; Finance and Accounting; and Administration. The procurement function lies within the Economic and Planning Department and currently has five full time staff whose main responsibility is to deal with commercial aspects and manage process. Technical aspects of procurement including the preparation of bidding documents is the responsibility of the functional departments. TSHPMB has some experience of Bank-financed procurement gained through the execution of a project preparation grant funded by the Policy and Human Resources Development (PHRD) Fund, and by advanced contracting for the access roads and bridges. EVN's Procurement Department has oversight of all procurement undertaken by TSHPMB and reviews and approves all procurement recommendations it makes. EVN has extensive experience of Bank-financed projects gained over 15 years as an implementing agency.

17. Procurement for Component 2 will be carried out by National Power Transmission Corporation (NPT) and its subsidiary Northern Power Projects Management Board (NPPMB). NPPMB is headed by a Director and has a dedicated Procurement Department, headed by a manager and staffed by 11 professionals. NPT has delegated responsibility for procurement of packages of goods, works and consultant services to NPPMB for projects with an estimated total value of VND 500 billion (equivalent to \$25 million); ODA projects are not delegated. NPPMB and NPT have extensive experience of Bank procurement gained from implementation of the

System Efficiency Improvement, Equitization and Renewables Project (SEIER, Cr. 3680), and Second Transmission and Distribution Project (TD2, Cr. 4107).

18. Procurement for Component 4 will be carried out by EVN's corporate headquarters, in particular the Appraisal and Investment Departments, with support from EVN's procurement Department.

19. An assessment of the capacity of the TSHPMB to implement procurement actions for the project has been carried out by Hung Tran Tan on July 23, 2010. The assessment reviewed the organizational structure for implementing the project and the interaction between the staff responsible for procurement, the administration and finance departments and EVN. It also reviewed performance of TSHPMB in the implementation of procurement financed by the PHRD grant and the advanced contracting now under way.

20. The key issues and risks concerning procurement for implementation of the project have been identified and include (i) potential understaffing in TSHPMB given the rapid increase that is likely to occur during the next 12-18 months; (ii) inadequate knowledge and experience of Bank-funded procurement for the wide range of activities to be undertaken; and (iii) differences between the Vietnamese Law on Procurement and the Bank's procurement policies and guidelines, which because of the sanctions and incentives system prevailing in Vietnam often result in slow decision making or referral of contentious issues to the next higher level of management.

21. The corrective measures which have been agreed are: (i) procurement training has been carried out for TSHPMB during preparation and will be continued on an as-needed basis during implementation; (ii) procurement support for major packages will be provided by the consultant hired to supervise the main works construction and goods manufacturing and installation; (iii) a procurement advisor with international experience may be hired if desired; and (iv) the Bank procurement specialists will provide ad hoc procurement training during supervision missions and through comments and advice on procurement documents submitted to the Bank for prior review.

22. The overall project risk for procurement is High and may be reduced to Substantial after mitigation.

#### PROCUREMENT PLAN

23. The Borrower has developed a procurement plan (an extract of which is attached at Tables A8.2 and A8.3) which was confirmed at appraisal and which provides the basis for the procurement methods outlined above. This plan will be agreed between the Borrower and the Project Team and be available at the offices of Trung Son Hydropower Project Management Board, 710 B Lac Long Quan, Hanoi. It will also be available in the project's database and in the Bank's external website. The Procurement Plan will be updated in agreement with the Project Team annually or as required to reflect the actual project implementation needs and improvements in institutional capacity.

#### FREQUENCY OF PROCUREMENT SUPERVISION AND BANK REVIEW

24. In addition to the prior review supervision to be carried out from Bank offices and regular interactions facilitated by the task team's presence in Hanoi, the capacity assessment of the Implementing Agency has recommended annual supervision missions to visit the field to carry

out post review of procurement actions. Procurement post review will be carried out for one in three contracts not subject to prior review.

#### ASSESSMENT OF COMPETITION IN PROCUREMENT

##### Works

25. Works contracts are expected to be procured using both ICB and NCB. Several of the contracts, particularly dam construction, can be expected to attract considerable international competition although significant amounts of the work may be subcontracted locally. Experience suggests that other contracts, for example for transmission and distribution line construction and for roads and bridges and resettlement area construction are not likely to attract international attention even though subject to ICB. Although some of these areas, such as power system construction is relatively specialized, experience in other projects suggests that there are numerous national and provincial level firms with sufficient skills.

##### Goods

26. Experience in other projects shows that most procurement of goods required for the project, will be subject to ICB. There are no domestic manufacturers capable of producing the main electro-mechanical items such as the hydro turbines and generators and control equipment; worldwide there are perhaps about six firms, though many have more than one manufacturing site. A contract of this size is likely to attract adequate competition.

27. There are a number of domestic suppliers capable of supplying the ancillary goods required for the project, including the hydraulic-mechanical equipment and materials for transmission and power lines. In addition several international firms maintain offices and in some cases production facilities in Vietnam. Many do so in large part to participate in procurement of goods financed by international financial institutions. Almost all goods procurement packages attract bids from one or more international firms. In general there is sufficient competition among suppliers, as evidenced by the closeness of bids in single packages and the relative consistency of unit prices among bidders across the range of goods to be supplied. Based on supervision of implementation of other projects, goods procured are generally of acceptable quality and conform with the requirements set out in bidding documents.

##### Consultant Services

28. Consultant services that are envisaged to be required for this assignment will mainly be available only from international firms and selection will usually use international competition. Major consultant assignments financed by the Bank and implemented by EVN attract considerable international interest and short lists of six well-qualified consultants are easily compiled. Competition is strong, conflict of interest and eligibility requirements are respected and evaluations of consultants rigorous. In several of the assignments planned to be financed, a combination of international and local expertise will be required, providing an opportunity for training and capacity building of local consultants and this is likely to foster formation of competitive joint ventures or other alliances of consultants.

#### DETAILS OF THE PROCUREMENT ARRANGEMENTS INVOLVING INTERNATIONAL COMPETITION

29. Table A8.2 contains a listing of all goods, works and non-consulting services to be procured following ICB and direct contracting in the first 18 months of project implementation.

Table A8.3 contains a listing of all consultant services in which international firms are expected to be shortlisted.

**Table A8.2: Goods, Works and Non-consulting Services To Be Procured Following ICB and Direct Contracting**

Ref No	Contract (Description)	Estimated Cost (thousand USD)	Procurement methods	Prequalification (yes/no)	Domestic preference (yes/no)	Review by Bank (prior/post )	Expected Bid-Opening Date	Comments
<b>W-MW-01</b>	Construction and Installation of Main Work	116,046.98	ICB	Yes	No	Prior	October 2011	
<b>W-MW-02</b>	Manufacturing, transporting and guiding installation of waterway and headworks	12,286.60	ICB	No	No	Prior	June 2012	
<b>W-MW-03</b>	Electro-mechanical equipments for powerhouse and downstream and communication equipments	71,319.11	ICB	No	No	Prior	November 2012	
<b>W-RB-04</b>	Construction of access road :	9,591.64	ICB	No	No	Prior	March 2011	
	<b>Lot 1(W-RB-04.L1):</b> Construction of road from km 0 + 284,32 to km 7 + 00	2,984.73						
	<b>Lot 2(W-RB-04.L2):</b> Construction of road from km 7 + 00 to km 13 + 00	3,456.38						
	<b>Lot 3(W-RB-04.L3):</b> Construction of road from km 13 + 00 đến km 20,408	3,150.53						
<b>W-RB-05</b>	Construction of bridges (along the access road):	5,180.02	ICB	No	No	Prior	March 2011	
	<b>Lot 1(W-RB-05.L1):</b> Construction of Co Luong bridge	1,117.82						
	<b>Lot 2(W-RB-05.L2):</b> Construction of medium- sized bridges	1,751.39						
	<b>Lot 3(W-RB-05.L3):</b> Co Me bridge constructions	2,310.81						
<b>W-RB-06</b>	Construction of in-site road:	8,787.33	ICB	No	No	Prior	April 2011	
	<b>Lot 1(W-RB-06.L1):</b> Construction of in-site road on right and left banks	4,023.51						
	<b>Lot 2(W-RB-06.L2):</b> Construction of road to quarry	4,763.81						



**Table A8.3: Consulting Assignments With Short-list of International Firms**

<b>Ref No</b>	<b>Description of assignment</b>	<b>Estimated cost (thousand USD)</b>	<b>Selection method</b>	<b>Review by Bank (prior/post)</b>	<b>Expected Proposals Submission Date</b>	<b>Comments</b>
<b>C-RB-05</b>	Construction supervision consultant of Trung Son access road	555.21	QCBS	Prior	February, 2009	
<b>C-ENV-01</b>	Independent environmental monitoring of main works and resettlement sites,	206.01	QCBS	Prior	March, 2011	
<b>C-SO-02</b>	Independent social monitoring of main works and resettlement sites	433.79	QCBS	Prior	March ,2011	
<b>C-MW-03</b>	(i) Verification of construction, manufacturing and technological drawings, (ii) consultants to assist procurement (iii) Construction and installation supervision of items of main works, in-site road system	5,187.49	QCBS	Prior	March ,2011	
<b>C-EMP-03</b>	Environmental and Social Technique assistance: Preparation of ToR, training of environmental group, preparation of software for environmental management, etc,	341.22	QCBS	Prior	March ,2011	
<b>C-EMP-04</b>	Implementation of CLIP packages	665.54	QCBS	Prior	April, 2011	
<b>C-EMP-15</b>	Environmental quality monitoring and pollution assessment consultant (construction phase),	237.69	QCBS	Prior	May,2011	
<b>C-RE-01</b>	Construction supervision of resettlement sites in Thanh Hoa and Son La provinces (road and electric system are included)	261.46	QCBS	Prior	August, 2011	
<b>C-EMP-17</b>	Changes monitoring and guiding to fish breeding and fishing	211.28	QCBS	Prior	July, 2012	

## **Annex 9: Economic and Financial Analysis**

### **VIETNAM: VN-Trung Son Hydropower Project**

#### **RECENT MACROECONOMIC DEVELOPMENTS**

##### **Background**

1. Vietnam weathered the 2008-09 global economic crisis relatively well. After registering real GDP growth of 5.3 percent in 2009, its economy grew by an estimated 6.8 percent in 2010. Vietnam stands out not only for achieving a higher average growth rate in the post-crisis period, but also a more stable growth path. The rapid recovery has been bolstered by higher level of investment and a strong revival in exports. Foreign direct investments have continued to remain buoyant and remittances have grown at a healthy rate. Exports are growing at 24 percent, with export of non-oil sector doing particularly well, having registered 30 percent growth in first eleven months of 2010. Overall, the recovery of the real sector of the economy has been both robust and remarkable.

2. Vietnam's strong recovery has, however, been tempered by its growing macroeconomic vulnerabilities. The annual inflation rate is currently hovering at double-digit level and its currency has been under intense pressure for the last several months. Foreign exchange reserves have declined and Vietnam's sovereign rating has recently been downgraded on account of persistent macroeconomic vulnerabilities, including default by one of the largest state owned enterprises. These instabilities were triggered by external shocks – the surge in capital flows in 2007 and the global financial crisis in 2008-09 – but have become increasingly domestic, with the authorities being slower to react and hesitant to disrupt the country's impressive growth record.

3. The first signs of macroeconomic problems can be traced back to 2007 when Vietnam experienced an unprecedented surge in external capital flow, fueling a credit boom and an asset price bubble. Between 2006 and 2007, foreign direct investment increased by three fold and portfolio flows by four-fold – with total external capital increasing from US\$3.6 billion (or 5.9 percent of GDP) in 2006 to US\$12.8 billion in 2007 (18 percent of GDP). Consequently, money supply grew rapidly, fueling a credit boom and creating an asset price bubble. Inflation rate accelerated and trade deficit widened rapidly during this period.

4. The economic boom came to a sudden halt as the global economy plunged into a financial and economic crisis during 2008. Capital flows slowed, with portfolio flow reversing from its peak of US\$6.2 billion in 2007 to US\$-0.5 billion in 2008. The stock market lost nearly 66 percent of its value in 2008. Fueled by global commodity price shocks, Vietnam's inflation rate accelerated to nearly 20 percent and its currency appreciated in real terms.

5. This was followed in 2009 by a global economic crisis that led to a significant slowdown in manufacturing growth, contraction in export demand and the possibility of closure of thousands of factories and millions of lost jobs. Many of the export-oriented firms, which had invested heavily with the belief that the boom would continue, suddenly found their orders cancelled and sales plunged. Some of the more leveraged firms, including the state owned enterprises, found it difficult to keep up with their debt service payments. A timely and large 'stimulus package' however helped to cushion the adverse impact of the global crisis.

6. The most recent episode of macroeconomic instability started in the second half of 2010 when the economy overheated following delayed withdrawal of the fiscal and monetary stimulus that had been introduced to deal with the impact of the global financial crisis. In

December 2010, inflation stood at a two year high of 12.2 percent, the dong came under intense pressure, and the level of foreign exchange reserves declined to \$12.5 billion (1.5 months of imports). The health of the banking sector also became a focus of concern, in part because of the build-up of contingent liabilities in the state-owned enterprise (SOE) sector. On account of this deterioration in the country's macroeconomic indicators and a default by one of its largest state owned enterprises, Standard & Poor's and Moody's downgraded Vietnam's sovereign rating to BB- and B1, respectively.

#### The Government's Policy Response

7. After the successful completion of the XI<sup>th</sup> Party Congress in January 2011, a consensus began to emerge within Government (including the provincial governments) behind the need for strong measures to restore macroeconomic stability. The authorities recognized that their attention and focus should be on addressing instability even if this comes at the expense of slower growth in the short term. The Government publicly indicated its intention to pursue "*tight and prudent monetary and fiscal policy*" and approved Resolution 11, which commits the government to a wide range of monetary, fiscal and structural policy reforms that are intended to cool an overheated economy. Several of the measures in the Resolution have already been implemented. Specifically, the State Bank of Vietnam (SBV) has issued Directive 01/CT-NHNH on March 1, 2011 to implement parts of Resolution 11 that fall under its ambit and similar Directives and Circulars are under preparation in all the relevant Ministries. A brief summary of the measures are as follows:

8. **Exchange Rate Policy.** The dong was devalued by 9.3 percent against the US dollar and the trading band was narrowed from +/-3% to +/-1%. This is the single largest correction to the exchange rate since the onset of macroeconomic instability in 2007. The authorities also indicated that the interbank average exchange rate will be managed more flexibly, consistent with the intention to gradually move to a more flexible exchange rate regime. Given a large and rapidly growing quasi-illegal trade in gold, which led to a significant increase in errors and omissions in the balance of payments, Resolution 11 instructs SBV to issue a Decree on Management of Gold Trading by the second quarter of 2011. The Decree will centralize gold exports, eliminate trading in gold bars, and prevent cross-border trafficking of gold. The Resolution instructs competent authorities to ensure that foreign exchange and gold traders comply with the law.

9. **Monetary Policy.** In the last four months, SBV has increased the base (refinancing) rate from 8 percent to 11 percent and revised upward the overnight market operation (repo) rate six times— from 7 percent to 12 percent. SBV also announced that the target for credit growth in 2011 will be cut to 20 percent from 39 and 30 percent in 2009 and 2010 respectively. This will be the lowest target for credit growth in the last 10 years. Concomitantly, the target for broad money supply growth has been kept at 15-16 percent during 2011 — the lowest since the start of economic reforms two decades ago.

10. **Fiscal Policy.** The government has announced that it will cut non-salary recurrent expenditure by 10 percent, not start new construction projects in the public sector, including in SOEs this year, and thereby reduce fiscal deficit to below 5 percent of GDP in 2011 (GoV's definition) — a 1 percentage point reduction relative to 2010 and 0.3 percentage point reduction relative to the 2011 budget estimate.

11. **Banking Sector.** Resolution 11 limits banks' exposure to non-productive activities (which include real estate and security market) to 22 percent of total credit by June 30, 2011 and to 16 percent by December 31, 2011. Non-compliant banks will be asked to double their required reserves ratio and restrict their business activities. SBV will review compliance at

the end of June 2011. The government is revising Decision 493 to upgrade loan classification and provisioning practice in the banking system to bring them closer to international norms. The revised Decision will be issued by May 2011. The government has also confirmed its participation in the Financial Sector Assessment Program (FSAP), and has sought technical assistance from the Bank and IMF.

12. ***State-Owned Enterprises.*** The Government has asked key Economic Groups to carry out independent audits using international norms and make the results available by end 2011. The Ministry of Planning and Investment (MPI) has been asked to review planned loans and investment projects of SOEs to identify those that can be dropped or scaled down. The report from MPI is due to the National Assembly by the end of March 2011. Resolution 11 also indicates that the Government will accelerate the equitization process and strengthen the governance of SOEs.

13. ***Other Structural Measures.*** The government is preparing a Circular to increase disclosure of information and policies affecting monetary management and banking, including submitting key statistics to the IMF's International Financial Statistics on schedule. A draft Circular has been sent to the Bank for review. Finally, the government is moving from an administrative mechanism for setting the prices of key commodities such as electricity, gas and fuel, to a more market-based mechanism. It has already announced an increase in electricity tariffs of 15.3 percent, and in the price of gasoline (by 18 percent), diesel (24 percent), and kerosene (21 percent). In addition, Resolution 11 instructs MoIT to prepare a regulation for establishing a market mechanism for pricing electricity.

14. The above policy measures constitute a credible plan for Vietnam to regain macroeconomic stability. The measures have been widely discussed and debated within the government, with representatives of large SOEs as well as with independent Vietnamese economists. It has the broad support of line ministries as well as key finance and budget committees in the National Assembly. The international financial markets have reacted favorably to the recent announcements, with Vietnam's sovereign spreads steadily declining over the past few days. This augurs well for successful implementation.

#### Macroeconomic Outlook and Risks

##### ***Fiscal Policy and Debt Situation***

15. Vietnam experienced a sharp increase in its fiscal deficit in 2009 on account of the stabilization measures. The government's overall fiscal deficit was 9.0 percent of GDP in 2009, substantially above those of previous years, as the stimulus package came on top of an already expansionary budget plan. In addition to the measures adopted to stimulate economic activities, the fall in oil prices and the slowdown in economic activities have resulted in a decline in the government revenue. This decline was partially offset in the second half of 2009, as both international commodity prices and domestic economic activities became more buoyant.

16. With a significantly higher than expected revenue outturn and expenditure in check, the government has achieved a lower fiscal deficit than planned during 2010. According to the latest IMF estimate, total budget revenue and grants increased from 26.7 percent of GDP in 2009 to 28.1 percent in 2010. Meanwhile, total budget expenditure (including off-budget expenditure) is estimated to have decreased by 3.1 percentage points, from 35.7 percent of GDP in 2009 to 32.6 percent in 2010. The fiscal deficit is therefore estimated to have declined from 9.0 percent of GDP in 2009 to 6.4 percent in 2010. Despite the downward

trajectory of the fiscal deficit, the slow pace of fiscal consolidation remains a matter of concern for the country's long term fiscal sustainability<sup>5</sup>.

17. Through its 2011 Budget, and recent Government's Resolution, GoV has indicated its intention to further consolidate the fiscal accounts and gradually reduce the fiscal deficit to pre-crisis levels. This process is being facilitated by reining in current expenditure, improving efficiency of public investment and scaling up the existing medium term budget framework being piloted in various line ministries to the national level.

18. Vietnam's public debt is likely to remain sustainable if the current economic recovery continues and the authorities carry on the current fiscal tightening. The results of the debt sustainability analysis conducted in 2010 indicate that the public sector debt was 49 percent of GDP at end-2009, two-thirds of which (31 percent of GDP) was owed to external creditors. Under the baseline scenario, this ratio was projected to increase to just above 50 percent of GDP during 2010-13 before starting to decline again thereafter. The large fiscal deficits in 2009 and 2010 do not affect the overall debt sustainability significantly, as long as the government reverts to the pre-crisis levels of deficit in a few years as expected. The stress tests indicate that the two main risks to debt sustainability are a loss of access to non debt-creating capital inflows and a slowdown of exports. The standard assumptions applied for these shocks are severe, and are unlikely to materialize.

19. The largest source of uncertainty and hence unquantifiable risk to the Debt Sustainability Analysis comes from implicit obligations which are not captured under public and publicly-guaranteed debt statistics. Neither a clear definition nor a reliable estimate of such liabilities is available, which limits the government's ability to manage associated risks. Contingent liabilities might arise from off-budget statutory funds such as health insurance fund, the banking sector, or large SOEs. The last one in particular is a serious concern. It is now well known that Vinashin (a ship-building economic group) used resources obtained through its preferential access to credit to invest heavily outside its core businesses and falsified financial reports. Collecting reliable and up-to-date information on contingent liabilities (mostly in the SOE sector) and assessing their fiscal risks has become a priority. And by articulating these changes taking place in the government to market participants and providing them with regular and up-to-date information on fiscal and debt situation, the government is trying to help to build confidence among market participants.

20. The second source of fiscal risk, albeit not of the same magnitude as contingent liabilities arises from the large size of off-budget expenditure, which has been funded by issuing off-budget bonds. The off-budget spending is managed by the Ministry of Planning and Investment (MPI) to build infrastructure such as canals, schools and housing for poor. While the off-budget spending is approved by the National Assembly and is subject to the same level of oversight and scrutiny as on-budget spending, it has been termed as off-budget (misleadingly in our view) because it is largely managed by MPI – a leftover from the planning era. In the last four years, off-budget expenditure financed by MPI bonds has increased sharply from 1.5 percent of GDP in 2007 to 2.8 percent. It is scheduled to fall to 1.9 percent of GDP in 2011 and to 1.8 percent of GDP in 2012.

### ***Changes in the Banking Sector***

21. The banking sector has been adversely affected by the succession of asset price bubbles, monetary tightening and growth slowdown. The real estate bubble of end-2007 and its subsequent freeze in early 2008 have made it difficult for several commercial banks to

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<sup>5</sup> According to MoF's Draft Strategy of Finance for the period 2011-2020, the fiscal deficit on the national definition will be gradually reduced to four percent of GDP.

recover their loans; the rapid disinflation in late 2008, at a time when interest rates were still very high, substantially increased the debt service burden faced by enterprises because of the rapid rise in real interest rates.

22. The asset quality of bank portfolios remains an ongoing concern given the unusually high credit growth of the past years and developing, but relatively weak, risk management capacity in the banking sector. According to the official data, the non-performing loan (NPL) ratio of the banking system was 1.9 percent, 2.5 percent and 2.4 percent in end-2009, March 2010 and August 2010, respectively. However, if international standards are applied, the NPL ratio of the banking sector is expected to be significantly higher. Currently, only 3 commercial banks are assessed to have the adequate capacity to use international method of calculating NPLs.

23. From the macroeconomic risk perspective, the financial health of the state-owned commercial banks (SOCBs) has often been highlighted as a source of concern. SOCBs play a dominant role in the banking sector, though they have been rapidly losing market share (in both credit and deposit markets) to the joint stock banks (JSBs) in the recent past. At the end of 2007, SOCBs' share in total outstanding credit was 59.3 percent and that for JSBs was 27.7 percent; by the end of 2010, these numbers were 51.4 percent and 34.8 percent respectively. Two SOCBs have started the equitization process and a third one plans to start this year. IFC has recently bought a 10 per cent stake in the third largest SOCB. In terms of credit growth, loan portfolio of the SOCBs has grown at a slower rate than the overall system in the past couple of years. For example, in 2010, SOCBs loan portfolio grew at 22 percent compared with the average of 40 percent growth in the JSBs. The share of SOCBs credit going to SOEs has also declined in recent years. For example, only 25 percent of Bank for Investment and Development of Vietnam's portfolio has been lent to SOEs in 2010 compared with 35 percent in 2009. For Agribank, the largest SOCB, the ratio was 6.6 percent and 4.4 percent, respectively.

24. The SBV has upgraded its supervision efforts and raised minimum capital requirements in response to the concerns about the health of the banking sector. By the end of 2008, all commercial banks had met the new requirements. The process of increasing the minimum charter capital continues, in part as a gentle push towards some consolidation of smaller banks. However, the deadline to increase the minimum charter capital further to 3 trillion dong (about \$150 million at today's exchange rate) by end 2010 was extended, when 18 of the smaller banks were unable to meet it. The SBV opted for a more measured implementation of this policy, especially in the current fragile macroeconomic environment.

25. In 2010, a number of other important changes in the policies and regulations governing the banking sector were announced. These include the removal of interest caps, the revised banking laws (namely, the Law on the State Bank of Vietnam (SBV Law) and the Law on Credit Institutions (LCI)), and regulation on prudential ratios. These together are expected to reshape the working environment of the banking sector. The SBV Law is expected to improve the accountability, mandate and autonomy of SBV in undertaking monetary policy. The LCI is seen as enhancing the autonomy, safety and soundness of credit institutions. The removal of the interest rate caps and the issuance of Circular 13 (replacing Decision 457) on prudential ratios are expected to affect the operation of the credit institutions. On one hand, credit institutions now have greater flexibility in setting interest rates, but on the other hand, are subject to the tighter prudential ratios, most notably the significantly higher capital adequacy ratio (9 percent as of October 01, 2010), while facing stricter requirements on the amount of funds eligible for lending activities (although the subsequent Circular 19 lightened this requirement to some extent).

26. Much needs to be done over the medium term, however, to address some of the structural weaknesses, particularly in the banking and state enterprise sectors, that have contributed to periodic bouts of macroeconomic instability. On this, Resolution 11 is less ambitious, partly because of a lack of capacity to detail actions in this area and also because there is less consensus within Government on the way forward. Various ongoing activities such as review of the state economic group model, taking stock of SOE reform and the formulation of Decrees to improve the management of state assets and equities in SOEs can, however, provide valuable ingredients for the formulation of a systemic reform program in the medium term.

27. Through various tasks in the work program, the Bank is providing policy advice and technical assistance to prepare detailed action plans for the reform of banking and SOEs, help build consensus behind them, and eventually support their implementation. The upcoming preparation of the FSAP will provide a platform for some of this work while ongoing TA on SOE Governance, the upcoming Vietnam Development Report 2012 on “Transition to Market”, and a policy note on ensuring that SOEs face hard budget constraints will support progress on the SOE issues. Through the Public Financial Management Reform project we are also assisting the Government in developing the legal framework and monitoring indicators to better manage contingent liabilities, including those arising from the SOE sector.

## **ECONOMIC ANALYSIS<sup>6</sup>**

### **Assumptions for Benefits**

28. The economic benefits of the project derive largely from the avoided costs of thermal energy generation (coal and gas), and the related avoided environmental costs. The firm capacity of the project also avoids some thermal capacity. Other smaller benefits include increased agricultural productivity in the project affected area, and flood control benefits. The assessment of the economic benefits requires the following assumptions.

29. Avoided generation costs: the avoided variable costs of the displaced coal and gas generation are based on the border prices of coal and gas. In wet summer months, when Trung Son runs 24 hours a day, the project replaces coal generation in the North, assumed to be the least efficient of the existing coal projects, Phi Lai 2.<sup>7</sup> In the dry season, Trung Son displaces, at the margin, gas fired generation in the South: again, in the competitive generation market that will be in operation by the time Trung Son is commissioned, at the margin it is the least efficient existing combined cycle gas turbines (CCGTs) that would be replaced (at Be Ria). The displaced gas generation is adjusted for the transmission losses in the 500kV system (taken as 2.5 percent).

30. World Oil price: Over the long term, both coal and gas prices are linked to the level of oil price, for which the World Bank’s current 2011 estimate of \$85/bbl (nominal) is used.<sup>8</sup> When escalated at 3 percent this results in a (nominal) world oil price of \$101.5/bbl in 2017, when generation at Trung Son starts. One may note that other authorities expect higher oil prices: for example the 2009 IEA Global Energy Outlook forecasts \$100/bbl by 2020 (at constant 2008 prices); many other forecasts have crude oil rising to over \$100/bbl already by the end of 2011.

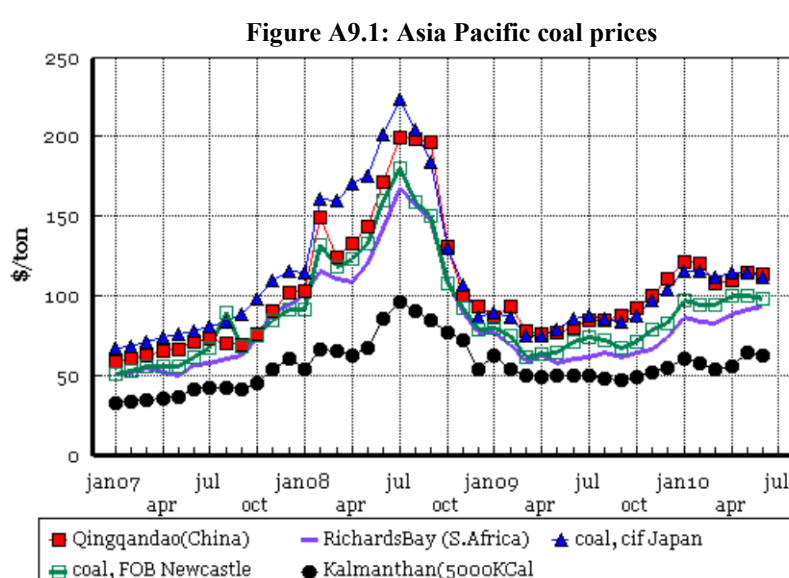
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<sup>6</sup> This is a summary of the more detailed presentation of the economic analysis in *Trung Son Hydropower Project: Economic Analysis Background Report*, November 2010.

<sup>7</sup> Pha Lai 1 and Uong Bi are currently the most inefficient coal plants, but these are planned to be retired in 2015-2016.

<sup>8</sup> The World Bank definition of average crude oil price (as used in its “Pink Sheets” and commodity price forecasts) is the average of West Texas Intermediate (WTI), Brent, and Dubai, typically 1-2\$/bbl higher than the OPEC Reference basket (ORB).

31. Coal price: For the economic analysis, the relevant value of coal is the border price of imported coal, adjusted for heat content. However, coals of lower heat value trade for less than what can be accounted for by heat value, as is illustrated by Indonesian coal: in the first quarter of 2009, so-called “Indonesian performance coal” of 5,900 Kcal/kg traded at an average of \$69.90/ton fob Kalimantan, whereas the more abundant Indonesian 5,000 Kcal/kg grade traded at \$55.17/ton. If heat value were the sole determinant, then the 5,000 Kcal/kg grade would be priced at \$59.15/ton, \$4.00/ton more than the actual price. Based on the long term relationship between Australian export coal and the world oil price, when crude oil is \$75/bbl, 6,300 Kg/Kcal coal fob Newcastle would be \$117/ton, and 5,000 Kg/Kcal Indonesian coal fob Kalimantan would be \$82/ton (again based on historical ratios, see Figure A9.1). When adjusted for transportation, the corresponding economic value of the displaced coal at Pha Lai is 88 \$/ton, equal to 868VND/kWh (at the current exchange rate of \$1=VND19,500).



Source: Platt's International Coal Report

32. Gas price: the gas used at the existing CCGTs that would be displaced by Trung Son benefits from a price significantly below international gas prices. Even the gas pricing formula for the Ca Mau project, namely  $1.17 + 0.45 \text{ HSFO}$ , where HSFO is the average monthly Singapore spot price for high sulfur fuel oil (as \$/mmBTU), provides for a price below gas traded in the region. Gas exported by Malaysia to Singapore is also indexed to the Singapore high sulfur fuel oil (HSFO) price, but at 90 percent rather than 45 percent. Therefore we estimate the economic price of natural gas at  $1.17 + 0.9\text{HSFO}$ , where the HSFO price can be taken as 80 percent of the world crude oil price (the impact of alternatives to this assumption are examined in the sensitivity analysis below).

33. Inflation and exchange rates: OECD inflation is taken at 2.7 percent. The domestic inflation rate is assumed at 8.4 percent in 2010, 8 percent in 2012, 6.10 percent in 2013 and 5 percent thereafter, implying a 2.3 percent per year foreign exchange depreciation rate over the longer term. All the fuel price and avoided cost calculations are done at nominal prices and exchange rates, then deflated to constant 2010 prices for the economic analysis.

34. Capacity benefit: The baseline capacity benefit is based on the Power Engineering and Consulting JSC No. 4 (PECC4) estimate of firm capacity at 42 MW. Consistent with the proposed Electricity Regulatory Authority of Vietnam (ERAV) practice for calculation of



capacity charges in the Vietnam Competitive Generation Market (VCGM), and with practice elsewhere in the region, the cost of capacity is based on a proxy CCGT reflecting international best practice. At the time of writing, absent a specific estimate from ERAV, we use the June 2009 study by the Singapore Regulator as the basis for costs.<sup>9</sup> The resulting estimate of US\$1,116/kW is somewhat higher than the estimated US\$850-950/MW for Vietnam's most recent CCGT units at Nhon Trach<sup>10</sup> - however the latter appears to be based on gross (ISO) capacity.

35. Definition of seasons: The new definition adopted by MoIT for the avoided cost tariff is adopted, with a wet season from July to October (rather than the traditional July to September).

36. Flood control benefits: The annual flood control benefit (at 2009 prices) has been estimated at VND 200 billion. From this must be subtracted the annual costs of the dyke repair program (VND 32 billion) and the value of lower power generation (VND 63 billion), for a net annual benefit of VND 105 billion, escalated at the 2010 domestic inflation rate to VND 114 billion.

#### Assumptions for Economic Costs

37. The breakdown of capital costs is shown in Table A9.1. Since VAT is refunded to the project sponsor within 3 months of payment, the base cost excludes VAT.

**Table A9.1: Economic Investment Cost**

base cost	6290.5 VND billion
physical contingencies	315.3 VND billion
total cost	6605.8 VND billion
exchange rate	19,500 VND/\$
	338.8 \$ million

(1) for a further breakdown of the base cost, see Table A9.21

38. The corresponding outlays over the seven-year construction period are shown in Table A9.2.

**Table A9.2: Construction Phasing, Economic Costs**

year	2011	2012	2013	2014	2015	2016	2017	Total
phasing	10.2%	15.3%	15.4%	16.0%	16.9%	22.6%	3.6%	10.2%
VND billion	673	1010	1018	1054	1118	1493	240	673

39. Other assumptions regarding costs include

- Escalation of foreign costs: to calculate the escalation of the cost of imported equipment we use the January 2009 World Bank forecast for the Manufacture Unit Value (MUV) index.<sup>11</sup>

<sup>9</sup> KEMA, *LRMC of CCGT Generation in Singapore for Technical Parameters used for Setting the Vesting Price for the Period 1 January 2009 to 31 December 2010*, Report to the Singapore Energy Market Authority, 22 June 2009.

<sup>10</sup> The estimate is consistent with that of the comprehensive survey of power plant investment costs prepared for the World Bank in 2008 (URS, *Study of Equipment Prices in the Energy Sector*)

<sup>11</sup> This index is generally accepted as a proxy for the price of developing country imports of manufactures in U.S. dollar terms. The index is a weighted average of export prices of manufactured goods for the G-5 economies (the United States, Japan, Germany, France, and the United Kingdom). Weights are the relative share in G-5 exports of manufactured goods to developing countries in a base year (currently 1995), with values: U.S. (32.2%), Japan (35.6%), Germany (17.4%), France (8.2) and United Kingdom (6.6%).

- O&M costs: taken as 1.5 percent of the overnight capital cost.
- Refurbishments: VND 735 billion (at 2010 price levels) in each of years 19 and 20 of operation
- Loss of forest value: VND 160 billion (based on estimates in the Strategic Environmental Assessment).

40. The NPV is VND7,038billion (\$361million) and the ERR is 18.9 percent (Table A9.3). The levelized economic cost is 963 VND/kWh (4.9 ¢/kWh).

**Table A9.3: Baseline Economic Returns**

			NPV	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
									1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
[1]	<b>power benefits</b>	<b>Real</b>																					
[2]	energy benefits	VNDb	10984						2	1222	1535	1580	1627	1675	1725	1776	1829	1884	1941	2000	2061	2123	2188
[3]	capacity benefits	VNDb	793						144	142	141	139	138	136	135	134	132	130	129	127	126	124	123
[4]	<b>other benefits / costs</b>																						
[5]	loss of forest value	VNDb	-105				-80	-80															
[6]	flood control benefits	VNDb	691						114	114	114	114	114	114	114	114	114	114	114	114	114	114	114
[7]	<b>total benefits</b>	<b>VNDb</b>	<b>12364</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>-80</b>	<b>-80</b>	<b>259</b>	<b>1478</b>	<b>1789</b>	<b>1833</b>	<b>1878</b>	<b>1925</b>	<b>1973</b>	<b>2023</b>	<b>2075</b>	<b>2128</b>	<b>2184</b>	<b>2241</b>	<b>2300</b>	<b>2362</b>	<b>2425</b>
[8]	<b>Real</b>																						
[9]	<b>Economic costs</b>	<b>[%]</b>		10.2%	15.3%	15.4%	16.0%	16.9%	22.6%	3.6%													
[10]	Investment costs	VNDb	-4592	-673	-1010	-1018	-1054	-1118	-1493	-240													
[11]	fuelcosts	VNDb	0					0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
[12]	Fixed O&M costs	VNDb	-592					-99	-81	-99	-99	-99	-99	-99	-99	-99	-99	-99	-99	-99	-99	-99	-99
[13]	Variable O&M costs	VNDb	0					0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
[14]	Major maintenance	VNDb	-142					0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
[15]	<b>total costs</b>	<b>VNDb</b>	<b>-5327</b>	<b>-673</b>	<b>-1010</b>	<b>-1018</b>	<b>-1054</b>	<b>-1118</b>	<b>-1592</b>	<b>-322</b>	<b>-99</b>	<b>-99</b>	<b>-99</b>	<b>-99</b>	<b>-99</b>	<b>-99</b>	<b>-99</b>	<b>-99</b>	<b>-99</b>	<b>-99</b>	<b>-99</b>	<b>-99</b>	<b>-99</b>
[16]	<b>Net economic flows</b>	<b>VNDb</b>	<b>7038</b>	<b>-673</b>	<b>-1010</b>	<b>-1018</b>	<b>-1134</b>	<b>-1199</b>	<b>-1333</b>	<b>1156</b>	<b>1690</b>	<b>1734</b>	<b>1779</b>	<b>1826</b>	<b>1874</b>	<b>1924</b>	<b>1976</b>	<b>2029</b>	<b>2085</b>	<b>2142</b>	<b>2201</b>	<b>2263</b>	<b>2326</b>
[17]	ERR	[ ]	18.9%																				
NPV			\$USm	361																			
levelised economic cost				963.2	VND/kWh																		
				4.9	UScents/kWh																		

**Table A9.4: Economic Returns including avoided social cost of GHG emissions**

		NPV	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	
								1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
[1]	avoided generation																						
[2]	coal	GWh						0	401	489	489	489	489	489	489	489	489	489	489	489	489	489	
[3]	gas	GWh						1	424	517	517	517	517	517	517	517	517	517	517	517	517	517	
[4]	LNG	GWh						0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
[5]	avoided GHG																						
[6]	coal	million kg						0	396	483	483	483	483	483	483	483	483	483	483	483	483	483	
[7]	gas	million kg						1	273	333	333	333	333	333	333	333	333	333	333	333	333	333	
[8]	LNG	million kg						0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
[9]	lifecycle-adjustments	million kg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
[10]	total	million Kg						1	669	816	816	816	816	816	816	816	816	816	816	816	816	816	
[11]		million tons						0.00	0.67	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	
[12]																							
[13]	carbon price	\$/ton	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	
[14]		mVND/ton						0.71	0.73	0.75	0.77	0.79	0.81	0.82	0.83	0.85	0.86	0.87	0.88	0.90	0.91	0.92	
[15]	avoided cost of GHG	VNDb	3855					0	489	611	626	642	657	670	680	690	700	710	721	731	742	753	
[16]		VNDb	1769					0	329	392	382	373	364	355	346	338	330	322	314	306	299	291	
[17]	economic flows	VNDb	7038	-673	-1010	-1018	-1134	-1199	-1333	1156	1690	1734	1779	1826	1874	1924	1976	2029	2085	2142	2201	2263	2326
[18]	net economic flows	VNDb	8807	-673	-1010	-1018	-1134	-1199	-1332	1486	2082	2116	2152	2190	2229	2271	2314	2359	2406	2456	2507	2561	2617
[19]	ERR	[ ]	21.0%																				
[20]	lifetime avoided carbon	mtonsCO2	31.7																				

Note: all calculations done for an assumed 40-year lifetime – 15 years shown here for sake of legibility

## Results

41. The economic returns are higher than those estimated by PECC4, which estimated a baseline ERR of 12.24 percent. The difference is largely attributable to the estimate of benefits: PECC4 assumes an economic value of dry season energy at VND720/kWh, and 400VND/kWh for wet season energy. The PECC4 estimate also excludes flood control benefits and loss of forest value. On the other hand, PECC4 used 0.5percent of capital costs for the annual O&M, which appears unrealistically low.

42. When the avoided cost of GHG is added to the analysis, the ERR increases to 21.1percent (Table A9.4). This calculation uses the actual emission factors of the avoided coal and CCGT projects that would be displaced by the efficient merit order dispatch likely in the competitive generation market: these are somewhat higher than the factors used in the simplified methodology for CDM purposes as shown in Table A9.5.

**Table A9.5: Emission Factor Calculations**

	IPCC default		Fuel	Avoided project	Heat rate	Emission factor
	kgCO <sub>2</sub> /GJ	kgCO <sub>2</sub> /mmBTU	Kcal /kg		KCal /kWh	Kg CO <sub>2</sub> /kWh
Anthracite	98.3		5022	subcritical (Pha Lai 2)	2402	0.99
Australian coal	89.7		6300	supercritical	2050	0.77
Gas	96.1	91.124		CCGT (average EVN Phu My)	1780	0.64

43. This calculation is a function of the thermal projects displaced in each season – 100percent coal in the wet season, and 100 percent CCGT in the dry season. Depending upon the excess capacity in the 500kV transmission grid, the ability to displace gas in the South may be limited.

44. Table A9.6 shows the results of different assumptions. If Trung Son were to displace only coal, the ERR falls from 18.9percent to 16.0 percent (because the avoided economic cost of coal is lower than of gas). However, the impact of the higher avoided GHG emissions is an additional 2.9 percent, bringing the total ERR to 18.9 percent. Similarly, if gas were displaced during both seasons, the ERR increases to 21.3 percent - but since gas has lower GHG emissions, the corresponding increase in ERR when avoided GHG emissions are considered is correspondingly lower (1.6 percent), bringing the ERR to 22.9 percent.

**Table A9.6: ERR Including Avoided GHG Emissions As A Function of Fuel Displaced**

	Wet season	Dry season	Lifetime avoided carbon	ERR	ERR incl. GHG	Impact of GHG
			Million tons CO <sub>2</sub>			
Displaces coal only	coal	coal	39.7	16.0%	18.9%	2.9%
Baseline (coal in wet season, gas in dry season)	coal	gas	31.7	18.9%	21.0%	2.1%
Displaces gas only	gas	gas	26.9	21.3%	22.9%	1.6%

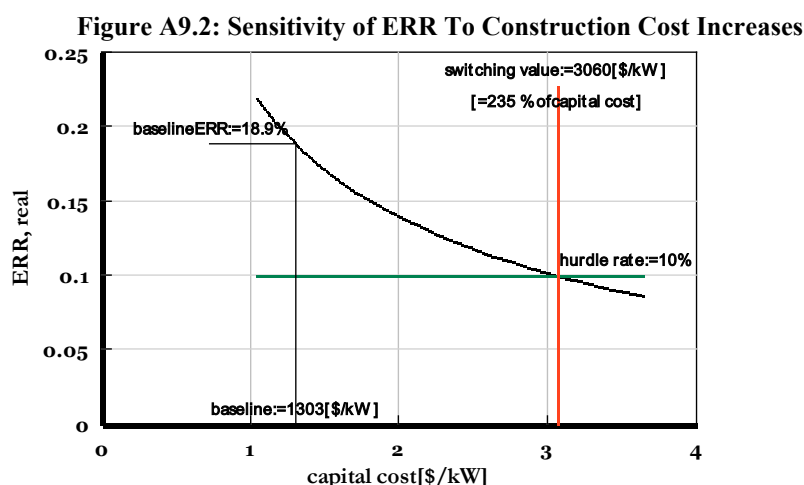
45. When life-cycle impacts are included in the avoided GHG emission calculation, life cycle avoided carbon emissions increase to 32.9 million tons CO<sub>2</sub>, a 3.8 percent increase. This reflects

that the lifecycle impacts of the displaced coal and gas generation (40-70g/kWh) exceed the life-cycle impacts of Trung Son (9g/kWh for reservoir emissions and 15g/kWh for hydro construction). However the ERR increases only slightly from the baseline 21.0 percent to 21.1 percent. The detailed economic analysis report presents a further discussion of the assumptions for life-cycle GHG emissions.

## Sensitivity analysis

### **Construction cost increases**

46. Construction cost increases are the bane of hydro projects. Figure A9.2 shows the sensitivity of ERR to construction cost increases. The switching value is a robust 2.35, meaning that the construction costs could be 235 percent higher than estimated and still meet the hurdle rate (i.e. \$3,060/kW rather than the 1,303\$/kW of the baseline estimate). Increases of this order of magnitude are extremely unlikely.



47. This holds constant the capacity benefit of the project (which is based on the avoided capital costs of thermal generation). But it could be argued that (real) capital costs of thermal generation are correlated with the (real) costs of hydro equipment, since both are imported: if this were the case, some part of the hydro construction cost increase would be offset by an increase in the capacity benefit. But the most probable cause of hydro cost increases are geo-technical delays and unexpected civil construction difficulties, so the assumption that hydro construction costs are independent of the avoided (thermal) capacity cost is reasonable (and in any event conservative).

### **Impact of delay**

48. The impact of delays in construction on economic returns depends upon when that delay occurs. If it occurs before construction begins (in effect delaying all costs and all benefits) there is no impact. But if it occurs towards the end of the construction period, when most of the construction costs have been expended, and the capital investment sits idly without producing any benefit, the impact may be significant. For example, if a one year delay occurs after 5 years of construction the ERR falls from 18.9 percent to 17.3 percent; but if a one-year delay occurs after 2 years of construction, the ERR falls only to 18.1 percent.

49. When construction delays do occur, there is also likely to be an additional cost (to fix the reasons for the delay). If there were an additional 5 percent of construction cost incurred during

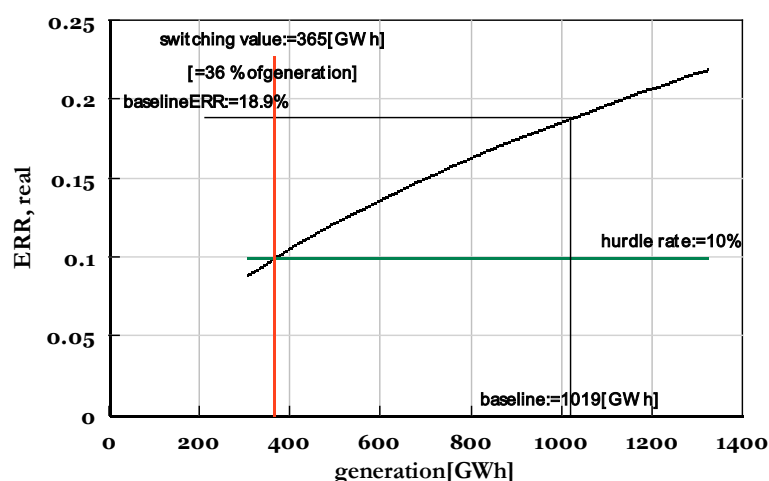
the year of delay after five years of construction, then the ERR falls from 17.3 percent to 26.9 percent; if this same delay and additional expenditure occurred after two years of construction, the ERR falls from 18.1 percent to 17.4 percent. If there were a two-year delay after five years of construction, and an additional 10 percent construction cost increase the ERR falls to 15.4 percent. The switching value (that brings the ERR to the hurdle rate) would require a delay of five years and a 62 percent cost increase.

50. We conclude that the economic returns are robust with respect to construction period delay. For construction to take 12 years instead of 7 years and suffer a 62 percent cost increase is extremely unlikely.

### **Generation**

51. The economic returns are relatively insensitive to likely deviations from baseline assumptions. As shown in Figure A9.3, the switching value for generation is 365 GWh, less than half of the baseline estimate (which also suggests that probable climate change scenarios, as may reduce the catchment area rainfall) will not have a significant impact on economic returns (discussed in more detail below).

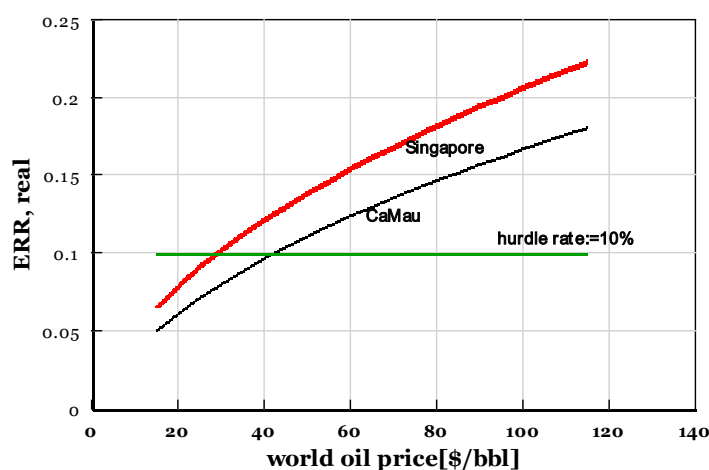
**Figure A9.3: Sensitivity Of Economic Returns To Average Generation**



### **World Oil Price Uncertainties**

52. The risk to project returns lies in the decline of long-term oil prices (and hence in coal and gas prices which determine the avoided costs of thermal generation). On the other hand, any increase in oil prices will also increase the economic returns. If the linkage of the gas to fuel oil price is 90 percent (as argued above), the switching value is 25\$/bbl (at 2009 price levels). At the 45 percent Ca Mau pricing formula, the switching value is 42\$/bbl (Figure A9.4). Given the recovery of the world oil price from its collapse in late 2008 to the present \$100/bbl trading range even with a very uneven global economic recovery, the likelihood of the oil price being near these switching values for any length of time is extremely unlikely (even if future oil prices were again to fall for some brief period of time during the lifetime of Trung Son during some future global recession).

Figure A9.4: Sensitivity of ERR To The Long-term World Oil Price



	gas price as fraction of Singapore HFO price	baseline ERR at 85\$/bbl	switching value \$/bbl
Ca Mau	0.45	15.2%	42
Singapore	0.90	18.9%	25

### *Impact of Higher Sedimentation Rates Than Expected*

53. Higher than expected sedimentation is a risk faced by many Asian hydro projects. It potentially affects project economics in two ways: first, sediment accumulation may encroach into the active storage of the reservoir, reducing the ability to absorb floods, and to operate the project optimally as a daily peaking plant. Second, high sediment loads may damage turbine runner blades, necessitating expensive runner blade replacement. Both are of potential concern to lenders, and in international practice for project financings, lenders will insist on clearly articulated sediment management regimes to mitigate the first risk, and may require the funding of a major maintenance escrow fund to mitigate the second.

54. In both of the World Bank's two recent large hydro projects in Asia – the 412 MW Rampur project in India, and the partial risk guarantee (PRG) for Nam Theun 2 in Laos - sedimentation has been raised as a potential issue. In the case of Rampur, drawing upon the evidence from other nearby projects, it was found necessary to institute a strict sediment flushing regime (with 12 hours shut-down during the peak monsoon season, and shutdown when silt concentration exceeds 4,000 pm), with a corresponding reduction in the baseline ERR from 20 percent to 18.6 percent.

55. Such severe problems faced by Himalayan hydro projects are not expected in the southeast Asian area. At Nam Theun 2, exhaustive studies concluded that sedimentation problem posed little risk, short or long term. An independent AUSAID study<sup>12</sup> concluded that little sediment mobilization is expected as the reservoir fills, but even were sedimentation rates greatly higher than currently expected are experienced, there would be no substantial impact on the long term viability of the dam.

<sup>12</sup> AUSAID, *Review of the Nam Theun 2 Hydroelectric Dam*, Lao DPR, 21 February 2005.

56. PECC4's studies for Trung Son draw a similar conclusion. Table A9.7 shows the estimated volumes of sediment expected to accumulate in the reservoir (compared with the total volume), using two different methods. To encroach on the active storage would require a sediment accumulation of 236.4 million m<sup>3</sup>, which even in the absence of a flushing regime would take more than 150 years to achieve. To have a significant effect on the ERR, there would need to be a significant encroachment within the first 10-20 years, which Table A9.7 shows to be extremely unlikely. Nevertheless, the recommendation that sediment loads be carefully monitored, and the sedimentation calculations verified after several years of operation, is sound.

**Table A9.7: Estimates Of Sediment Accumulation At Trung Son**

Period (year)	Bruno Method		HEC-6 model
	V <sub>reservoir</sub> (10 <sup>6</sup> m <sup>3</sup> )	V <sub>sediment</sub> (10 <sup>6</sup> m <sup>3</sup> )	V <sub>sediment</sub> (10 <sup>6</sup> m <sup>3</sup> )
1	349	0	0.764
10	335	14	10.7
20	320	29	22.5
30	305	44	32.5
40	290	59	44.1
50	275	74	55.1
60	260	88	64.9
70	246	103	75.5
80	231	117	84.5
90	217	132	95.1
100	203	146	104

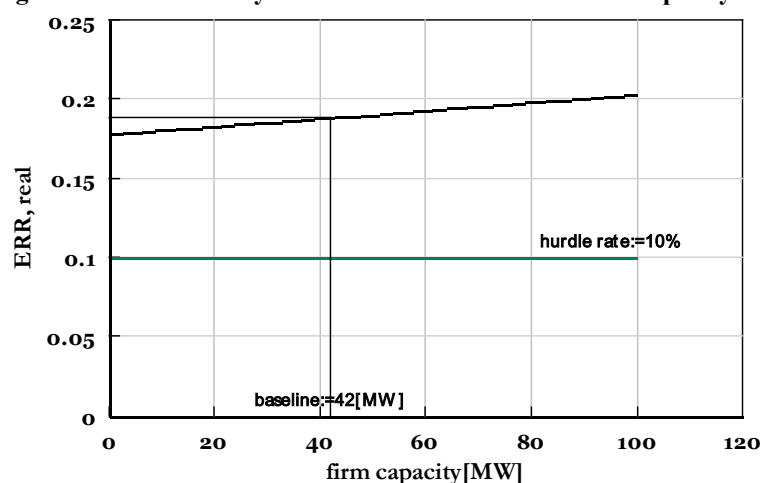
57. PECC4 has stated that there is no need for a low level outlet to flush out sediment, since even 100 years of sedimentation (146 million m<sup>3</sup> based on the worst case Bruno method, see Table A9.7) is less than the dead storage volume of 246 million m<sup>3</sup>. Nonetheless, TSHPCo has decided to include a sediment sluice in the project design, to mitigate the risk of substantial increases in the rate of sedimentation that could be brought about by human activities in the catchment area such as increases in mining or deforestation. The additional benefits to the environment of improved water quality and to operations by providing a means to reduce the reservoir water level have not been quantified in this analysis.

#### ***Firm capacity***

58. The economic returns are not sensitive to the value assumed for firm capacity. The PECC4 estimate is only 42 MW, which appears low, but which is used in our baseline estimate. The firm capacity determines the value of the capacity credit counted as a benefit. As shown in Figure A9.5, even if there were no capacity credit (corresponding to zero firm capacity), the ERR is 17.8 well above the hurdle rate.



Figure A9.5: Sensitivity Of Economic Returns To Firm Capacity Estimate



### *O&M expenses*

59. The PECC4 estimate of (fixed) annual O&M costs is 0.5 percent of the completed capital cost. A more realistic figure is 1-1.5 percent. However, as suggested by Table A9.8, within the plausible range of O&M costs the impact on economic returns is small.

Table A9.8: Sensitivity of Economic Returns to O&M Costs

	ERR
0.5%	19.3%
1.0%	19.1%
1.5% [baseline]	18.9%
2.0%	18.6%

### *Climate change*

60. Figure A9.3 indicates that average annual generation would have to fall to 520GWh for the ERR to fall to the hurdle rate. For climate change to produce so large a change in hydrology seems most unlikely, even under MoNRE's high scenario of climate change. Climate change could have two undesirable impacts on hydro projects: lower dry season inflows; and accompanying intensification of storms in the wet season (which may mean greater spill given reservoir storage limitations, and hence lower wet season generation).

61. The impact on economic returns would also very much depend upon the speed with which these changes occur. If most of the change occurs 20-30 years hence, the ERR is little affected, because it will depend mainly on inflows during the first few years of operation, when benefits have the greatest impact on ERR.

62. To assess the downside risk from climate change induced inflow reductions, the following scenarios have been assessed:

- *Scenario A*: modest decline of 5 percent, based on the MoNRE scenario.<sup>13</sup>
- *Scenario B*: gradual decline in generation, with 18 percent lower generation by 2035.
- *Scenario C*: rapid decline starting in 2015, with 16 percent lower inflows by 2025.

<sup>13</sup> Ministry of Natural Resources and Environment, *Climate Change and Sea Level Rise Scenarios for Vietnam*, Hanoi, June 2009.

- *Scenario D*: rapid decline starting in 2011, 26 percent lower inflows by 2035

63. The impact on economic returns is small (Table A9.9). Even the most unfavorable reduction in generation (scenario D), as might correspond to the “runaway climate change” scenario feared by some, leaves economic returns above the hurdle rate. One may conclude that even under the most pessimistic climate change assumptions, the Trung Son economic returns are robust.

**Table A9.9: Impact of Climate Change Scenarios on generation**

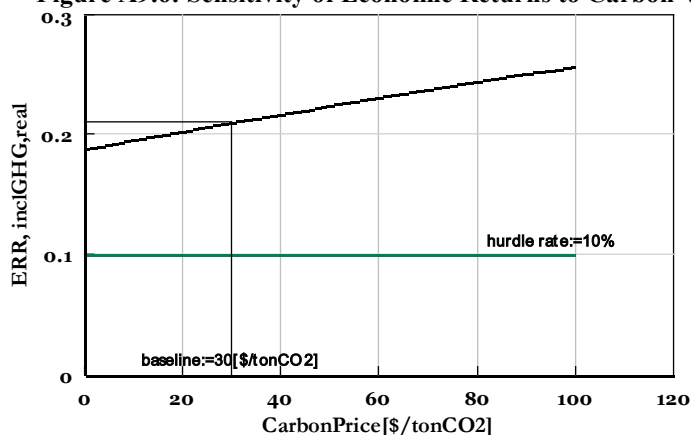
		2018(1)	2025	2035	ERR
Baseline generation	[GWh]	1019	1019	1019	18.9%
A. Small impact (MoNRE) worst case	[GWh]	1019	978	968	18.6%
			(-4%)	(-5%)	
B. Gradual decline	[GWh]	1019	937	836	18.1%
			(-8%)	(-18%)	
C. Rapid decline starting in 2015	[GWh]	1019	856	734	17.5%
			(-16%)	(-28%)	
D. Rapid decline, starting in 2010	[GWh]	917	754	713	16.4%
(“runaway climate change”)		(-10%)	(-26%)	(-30%)	

(1) 2018 is the first year with 100% of expected generation

### ***Carbon Externality Value***

64. The baseline carbon value is taken as \$30/tonCO<sub>2</sub>, constant in real terms over the lifetime of the project.<sup>14</sup> However, these may or may not reflect the actual long-term damage costs, for which some studies propose much higher values. As shown in Figure A9.6, the ERR including avoided GHG emissions rises from 21 percent at the baseline value of \$30/tonCO<sub>2</sub> to 24.4 percent at \$80/ton.

**Figure A9.6: Sensitivity of Economic Returns to Carbon Value**

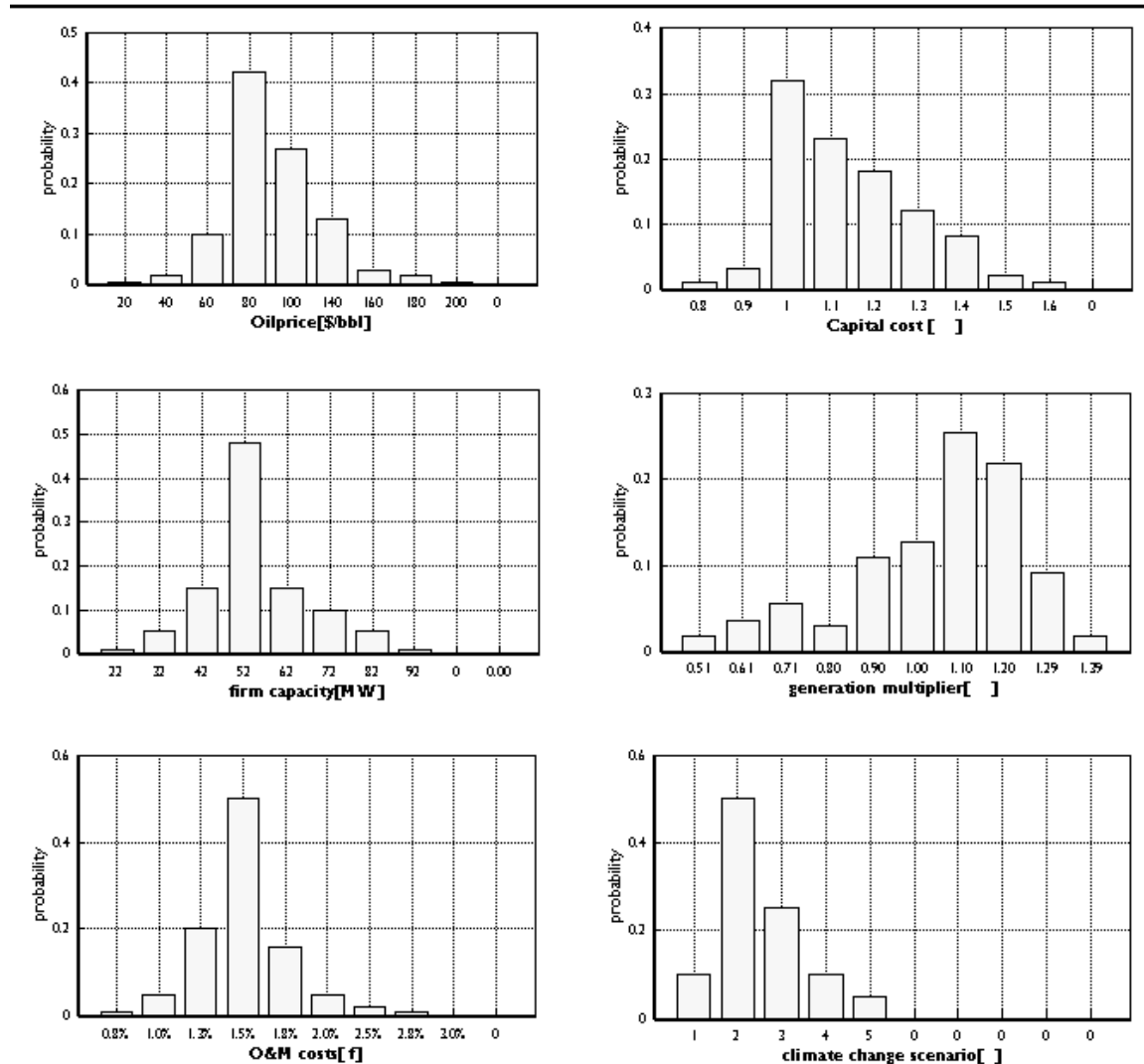


<sup>14</sup> This is based on the lower value of the social cost of carbon in the Stern Report, and does not purport to reflect the market price (which in wake of the uncertainties of the Copenhagen Conference and the global financial crisis has dropped significantly in 2010 below the 2008 peak of average CO<sub>2</sub> prices of \$27.9\$/ton (World Bank, *State and Trends of the Carbon Market 2010*). The detailed economic analysis report discusses further the rationale for taking the social cost of carbon at \$30/ton CO<sub>2</sub>.

## Risk Assessment

65. The detailed economic analysis report includes a Monte Carlo risk assessment of the economic returns: input assumptions are specified as probability distributions, and the ERR calculation is performed 5,000 times and the output distribution of ERR specified as a corresponding probability distribution – which allows an assessment of the chance that the hurdle rate is not achieved (an assessment that is not possible looking just at the switching values and sensitivity analysis which looks at only one variable at a time, holding the others constant).

**Figure A9.7: Input probability distributions**

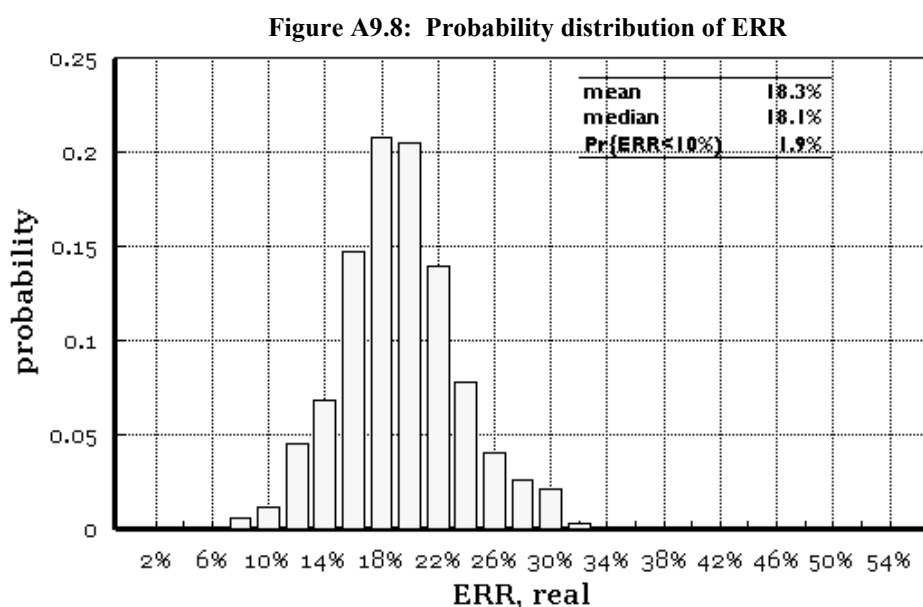


66. The probability distributions of the important input assumptions are shown in Figure A9.7. The construction costs are strongly asymmetrical, for cost overruns are far more likely than cost under runs. On the other hand, the probability distribution for the world oil price – which governs benefits (since the avoided cost of generation is determined by the economic price of fossil fuels that are tied to international prices) – is biased upward (as discussed previously, the IEA Global Energy Outlook estimate of the long term world oil price is much higher than the

World Bank forecast). The probability distribution for generation is taken directly from the output of the reservoir simulation model, which calculates generation over the hydrological record.<sup>15</sup> The climate change scenarios are represented by an integer variable corresponding to the various scenarios discussed above: the highest probability is assigned to the MoNRE base case (see Table A9.9 for the impact of each scenario on the generation estimate).

67. An important issue in such analysis is the assumption of independence – which if not met would require specification of multivariate functions (with non-zero covariance). Although one might hypothesize that higher oil prices tend to occur during commodity booms which drive up construction prices (as certainly happened in 2008), what matters is the average oil price over the first 15-20 years of the project lifetime – i.e. over the long term, whereas construction costs are locked-in over the short term, so independence between these two most important variables is highly likely. It is also reasonable to argue that the hydrology (generation) variables are also independent of both oil prices and construction costs.

68. The result of the simulation is shown in Figure A9.8. The expected value of ERR is 18.3 percent, slightly lower than the baseline estimate of 18.9 percent: the two most important input assumptions with asymmetrical distribution – the world oil price (which governs benefits) and construction costs – roughly balance out. The probability of not meeting the assumed 10 percent hurdle rate for FIRR is 1.9 percent.

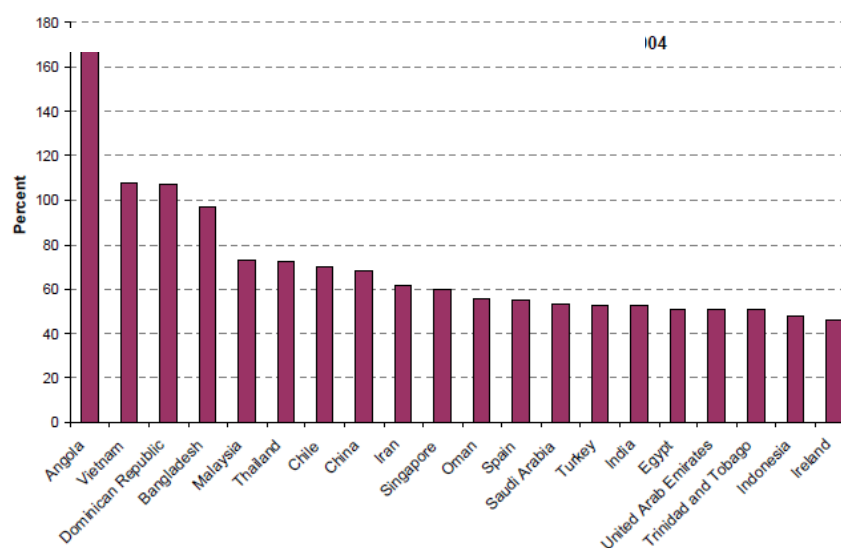


## Carbon Accounting

69. In the past decade, Vietnam's GHG emissions have risen sharply, and a recent World Bank comparative study shows Vietnam to have the second highest GHG emission growth rate among countries in the decade 1994-2004 (Figure A9.9) – albeit from a very low base.

<sup>15</sup> The results of the reservoir model simulation models are discussed further in the detailed economic analysis report.

**Figure A9.9: Growth in GHG Emissions Between 1994 and 2004**



Source: R. Bacon and S. Bhattacharya, *Growth and CO2 emissions: how do different countries fare?*, World Bank Environmental Department Papers, 113, November 2007.

70. The growth rate may be high, but in absolute terms emissions are still low: Vietnam's emissions, and emissions per capita, are the lowest among its main regional neighbors, as is its per capita GDP (Table A9.10). Only in terms of emissions per unit of GDP is it comparable to Malaysia, Thailand and Indonesia.

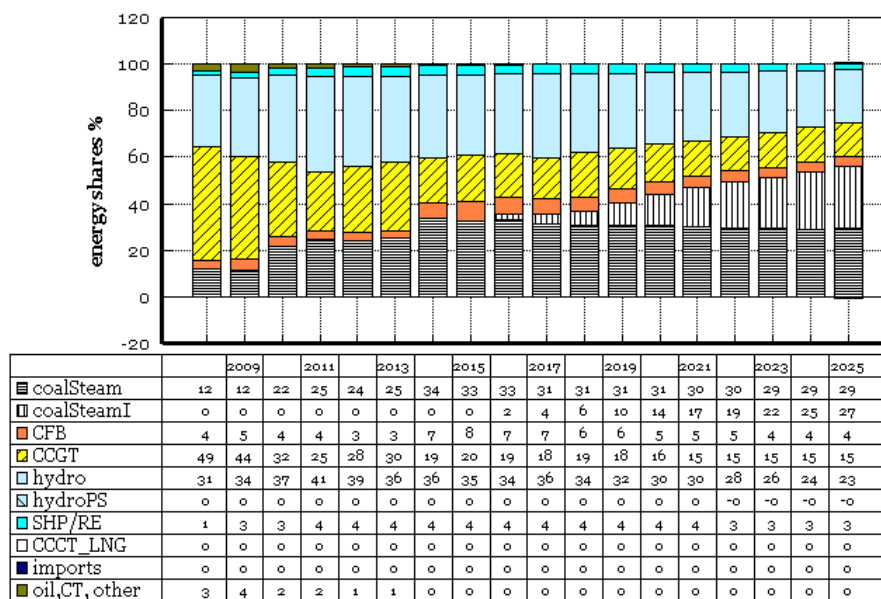
**Table A9.10: Comparative Indicators for Vietnam's GHG Emissions**

	2004 emissions, million metric tons	2004 Per capita GDP at market exchange rate	Tons/ \$million GDP at market exchange rate	%CO2 from fossil fuel combustion	Emissions per capita (tons/ person)
<b>Vietnam</b>	<b>57</b>	<b>496</b>	<b>1,394</b>	<b>52</b>	<b>0.69</b>
China	4,707	1311	2,745	59.5	3.60
Philippines	75	1,094	836	30.4	0.92
Indonesia	308	894	1,564	9.3	1.4
Malaysia	154	4,296	1,437	12.5	6.17
Thailand	219	2,356	1,457	48.8	3.43
USA	5,912	36,234	552	86.8	20.01

Source: Bacon & Bhattacharya, *op.cit.*

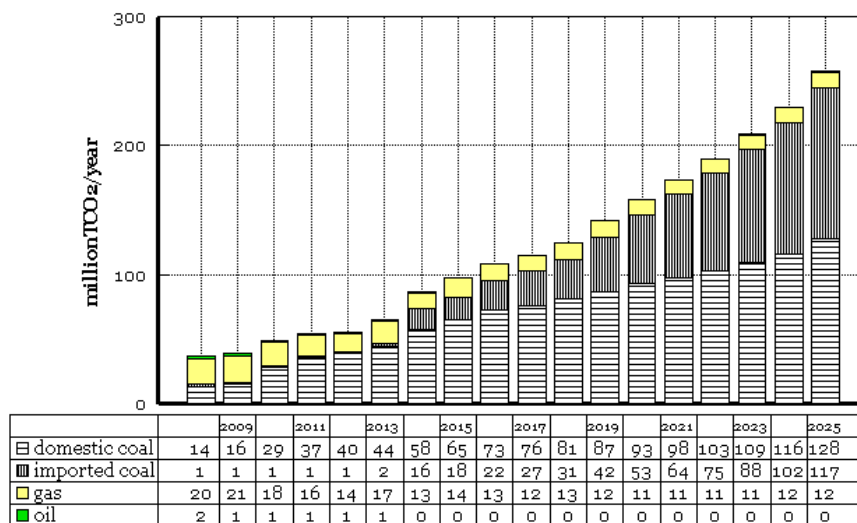
71. In 2008, domestic coal (anthracite) accounted for 12 percent of energy generation, compared to 44 percent from gas. But as shown in Figure A9.10, this is expected to change significantly over the next years, as coal comes to dominate power generation: by 2020, coal will account for 50 percent of generation, and gas only 16 percent; by 2025, 60 percent will be coal.

**Figure A9.10: Power Sector Generation Mix (Share of Energy Generation)**



72. Thus power sector GHG emissions will rise rapidly over the next 20 years, as shown in Figure A9.11 - from 49 million tons of GHG emissions in 2008 to some 250 million tons in 2025.

**Figure A9.11: Power Sector GHG Emissions**



### Combustion Emission Factors

73. Table A9.11 shows the IPCC default emission factors for the main fossil fuels. Vietnam's domestic coal is largely anthracite, which has the highest GHG emission factor per unit of energy among fossil fuels.

**Table A9.11: CO<sub>2</sub> Emission Factors From Combustion**

	Kg CO <sub>2</sub> /TJ Kg/mmBTU	
Anthracite	98300	93.21
Bituminous	94600	89.70
sub-bituminous	96100	91.12
Lignite	101000	95.77
Diesel	74100	70.26
Fuel oil	77400	73.39
Gas	56100	53.20

Source: IPCC, default values

### **UNFCCC defaults**

74. One option for the calculation of the GHG emissions impact of TSHPP would be to use the UNFCCC emission factors for approved CDM projects: the Song Muc small hydro project has an approved emission factor of 0.6KgCO<sub>2</sub>/kWh.<sup>16</sup>

75. However, this value has been derived on the basis of the simplified methodology available to small projects under 15MW.<sup>17</sup> This is based on the average of the so-called “build margin”, and the “operating margin” - calculations of average emissions of the power system per kWh generated, and for which the default emission factors of Table A9.11 can be used. The merit of this calculation is its simplicity; the ease of its validation; and the likelihood that it is conservative. But the question is whether it is too conservative?

76. During the wet season, when TSHPP project runs more or less 24 hours per day, it will displace coal generation in the North, with the result that the most inefficient coal unit should be taken off-line for this period. There is no reason to suppose that the dispatch centre would back down an “average” unit, as implied by the simplified methodology. Indeed there are significant variations in heat rate (and hence variable cost) among the older coal units, as shown in Table A9.12.<sup>18</sup>

**Table A9.12: Heat rates at the existing coal-fired units in Northern Vietnam**

	2003	2004	2005	2006	Average heat rate, Kcal/kWh	efficiency
Pha Lai 1	2578	2202	2458	2937	3146.6	27.3%
Pha Lai 2	3202	3529	4300	4315	2351.6	36.6%
Uong Bi	730	641	670	756	3747.5	22.9%
Ninh Binh	680	633	690	793	4155.3	20.7%
average						26.9%

Source: IoE

77. Similar variations in heat rates also apply to gas-fired units, as shown in Table A9.13, with a range of efficiencies from 40.8 percent to 50.7 percent.

<sup>16</sup> UNFCCC CDM-SSC-PDD, Song Muc Hydro Project, 2005.

<sup>17</sup> UNFCCC, Methodological Tool, Version 01.1, Tool to calculate the emission factor for an electricity system.

<sup>18</sup> Current IoE assumptions are that the Uong Bi and Ninh Binh units will be retired in 2015. However, the efficiency of Pha Lai 1 is significantly lower than that of Pha Lai 2.

**Table A9.13: Heat rates at existing gas-fired CCGTs in Southern Vietnam**

	2003	2004	2005	2006	Average heat rate, BTU/kWh	efficiency
Ba Ria	2138	2163	2204	2022	8367.4	40.8%
Phu My 21	3477	4398	3640	6112	7454.7	45.8%
Phu My 1	6397	6518	7171.3	6417	6877.8	49.6%
Phu My 4	-	1628	3013	3211	7306.9	46.7%
Phu My 3	167	4154	4441	4110	6730.2	50.7%
Phu My 22	-	210	3720	4856	6883.1	49.6%

Source: IoE

78. Most of the gas generation in Vietnam is in combined cycle units, not open cycle units. Even the worst performing CCGT has an efficiency of 40.8 percent, substantially above the 33 percent efficiency used in the Song Muc Calculations (which appears to be based on open cycle gas turbines, which account for only a very small proportion of the total gas generation).<sup>19</sup> And, as in the case of the coal units, there is no reason to suppose that the gas plant that would be displaced is the “average” project; rather, it will be the plant with the worst heat rate (Ba Ria).<sup>20</sup>

### ***GHG emissions from reservoirs***

79. GHG emissions from hydro dams remain a controversial topic. In 2000 the World Commission on Dams noted three points that are still valid:<sup>21</sup>

- Hydropower cannot, a priori, be automatically assumed to emit less greenhouse gas than the thermal alternatives. Net emissions should be established on a case by case basis.
- The flooded biomass alone does not explain the observed gas emissions. Carbon is flowing into the reservoir from the entire basin upstream, and other development and resource management activities in the basin can increase or decrease future carbon inputs to the reservoir.
- As natural habitats also emit greenhouse gases it is the *net* change due to impoundment that should be used for assessment, and not the gross emissions from the reservoir.

80. Absent any Asian data on methane and CO<sub>2</sub> fluxes from reservoirs<sup>22</sup>, the best that can therefore be done is to calculate an upper bound on gross GHG emissions based on the same Brazilian data upon which UNFCCC has based its own proposal for default calculations.

<sup>19</sup> This illustrates some of the problems that Vietnam’s small hydro projects have encountered in obtaining CDM registration: the proposition that a simple calculation methodology is more reliable and conservative than a more sophisticated assessment of the impact on dispatch is clearly in some doubt.

<sup>20</sup> These problems have been discussed by UNFCCC in the revised methodology document for grid-connected renewable energy, which describes the procedures for a more reliable calculation based on plant dispatch information. (UNFCCC *Consolidated Baseline Methodology for Grid-connected Electricity Generation from Renewable Sources*, 19 May 2006).

<sup>21</sup> World Commission in Dams, Final report on Dams and Development A New Framework for Decision-making to the Framework Convention on Climate Change, November 2000.

<sup>22</sup> The plan for vegetation clearance has detailed estimates of the standing biomass, but it seems that the area to be completely cleared is limited to some 50 ha with 4,700-5,000 tons of flooded biomass to be collected and cleaned (47-50 ha). This is based on what must be removed to assure that the level of dissolved oxygen will be similar to present levels: the remaining biomass is estimated at 40 tons/ha (or 52,400 tons) (PECC4, *Reservoir Vegetation Cover Removal Plan*).



### **Power density**

81. The so-called power density, measured as watts/m<sup>2</sup> of reservoir area has come into increasing use as a proxy for the GHG efficiency of a hydro project. UNFCCC has issued a draft guideline for the CDM eligibility of hydro projects that uses this measure:<sup>23</sup>

- Projects with power densities (installed power generation capacity divided by the flooded surface area) less than or equal to 4 W/m<sup>2</sup> are excluded;
- Projects with power densities greater than 4 W/m<sup>2</sup> but less than or equal to 10 W/m<sup>2</sup> can be eligible, but with an emission penalty of 90 g CO<sub>2</sub>eq/kWh;
- Projects with power densities greater than 10 W/m<sup>2</sup> are eligible without penalty.

82. UNFCCC notes that in a database of 245 hydro plants in operation in the world today with at least 30 MW of installed capacity, it finds the average power density is 2.95W/m<sup>2</sup>.

83. With a flooded area at full reservoir level of 13.1 km<sup>2</sup>, and a power output of 260MW, the power density of Trung Son calculates to 19.8 Watts/m<sup>2</sup>. This compares favorably with the range of power densities for Brazilian projects for which detailed methane and CO<sub>2</sub> flux survey data is available (and which are the basis for the thresholds proposed by UNFCCC) (Table A9.14).

**Table A9.14: Power Densities for Brazilian Hydro Projects and Trung Son**

Project	Province	Installed capacity	Reservoir area	Power density
		MW	Km2	W/m2
Xingo	Caatinge	3000	60	50
<b>Trung Son</b>	<b>Vietnam</b>	<b>260</b>	<b>13.13</b>	<b>19.8</b>
Segredo	Mata Atlantica	1260	82	15.47
Itaipu	Mata Atlantica	12000	1549	8.13
Miranda	Cerrado	390	50.6	7.72
Tucuri	Amazonica	4240	2430	1.74
Serra da Mesa	Cerrado	1275	1784	0.71
Barra Bonita	Mata Atlantica	141	312	0.45
Samuel	Amazonica	216	559	0.39
Tres Marias	Cerrado	396	1040	0.38

*Source: Marco Aurélio dos Santos et al., Variability of Greenhouse Gas Fluxes from Hydropower Reservoirs in Brazil, UNESCO Workshop on Freshwater Reservoirs and GHG Emissions, Paris, November 2006.*

84. Table A9.15 shows power densities for hydro projects in Vietnam, including power densities for the small hydro projects to be financed under the World Bank's Renewable Energy Development Project (REDP).

<sup>23</sup> UNFCCC CDM Methodology Panel, Nineteenth Meeting Report, Annex 10, *Draft Thresholds and Criteria for the Eligibility of Hydroelectric Reservoirs as CDM Projects*.

**Table A9.15 Power Densities for Vietnamese Hydro Projects**

Project	Installed Capacity	Reservoir area	Power density
	MW	Km2	W/m2
<b><i>Large hydro</i></b>			
Trung Son	260	13.13	19.8
Song Bung 4	156	15.8	9.9
<b><i>Small Hydro</i></b>			
Sung Vui	18	3.2 ha	563
Nam Tang	6.5	0.3 ha	2167
Dak Me	4	2.1 ha	190
Can Ho	4.2	0.7 ha	600
Ha Tay	9	64ha	14

***Comparison of reservoir GHG emissions with avoided thermal emissions***

85. As noted, to calculate the avoided GHG emissions from thermal generation we make the conservative assumption that during the dry season, Trung Son displaces gas CCGT in the South (which is true only to the extent that the 500kV transmission line has excess capacity). In the wet season we assume that Trung Son displaces coal.

86. The marginal (i.e., worst heat rate) gas project is Ba Ria (see Table A9.13), and the marginal coal project is taken as the average of the three worst heat rate plants. The average daily avoided GHG emissions from thermal generation compute to 6.9 million Kg/day (Table A9.16).

**Table A9.16: Avoided GHG Emissions From Fossil Fuel Combustion**

		wet	dry	total
average GWh		545	449	
Days		123	242	
GWh/day		4.43	1.86	
fuel displaced		anthracite	natural gas	
Emission factor	Kg/mmBTU	93	53.20	
Heat rate	BTU/kWh	14612	8367	
Emission factor	KgCO2/kWh	1.362	0.445	
million Kg/day		6.0	0.8	6.9

87. The methane and CO2 emissions from the Trung Son reservoir are calculated in Table A9.17. The fluxes are the median values from the Brazilian surveys <sup>24</sup>

<sup>24</sup> Source: Marco Aurélio dos Santos *et al.*, *Variability of Greenhouse Gas Fluxes from Hydropower Reservoirs in Brazil*, UNESCO Workshop on Freshwater reservoirs and GHG emissions, Paris, November 2006.

**Table A9.17: Methane and CO<sub>2</sub> Flux From the Trung Son Reservoir**

Component	Units	
<b>Methane flux from reservoir</b>		
methane flux	[mg CH4/day]	80
Global warming potential	[ ]	21
CO <sub>2</sub> emissions	[mg CO <sub>2</sub> /day/m <sup>2</sup> ]	1680
reservoir surface area	[Km <sup>2</sup> ]	13.1
CO <sub>2</sub> per day	[kg/day]	22008
<b>CO<sub>2</sub> flux from reservoir</b>		
CO <sub>2</sub> emissions	[mg CO <sub>2</sub> /day/m <sup>2</sup> ]	2600
reservoir surface area	[Km <sup>2</sup> ]	13.1
CO <sub>2</sub> per day	[kg/day]	34060
<b>Total CO<sub>2</sub> +CH<sub>4</sub></b>	[kg/day]	56068
	[tons/year]	20464
As fraction of avoided thermal emissions	[%]	0.8%

88. This calculation has high uncertainty, and is almost certainly conservative because it ignores the natural fluxes that occur in the absence of the project, and because we assume that the avoided thermal generator in the dry season is gas-CCGT in the South. Given that the upper bound on gross emissions is less than 1 percent of what is displaced, one can be reasonably confident that the GHG emissions impact of the Trung Son reservoir can be ignored. Indeed, it is of the same order of magnitude of the avoided 500kV transmission losses associated with the displacement of gas generation in the South, also ignored in this calculation.

89. Under the revised CDM rules, the default emission factor for projects with power densities between 4 and 10W/m<sup>2</sup> is 90kgCO<sub>2</sub> /MWh. With annual generation of 1,019,000 MWh, the corresponding Trung Son CDM default emissions calculate to 91,700 tons CO<sub>2</sub>/year, 4 times higher than the detailed calculation of Table A9.17 that shows 20,464 tons/year. Of course, with a power density of 19.8 W/m<sup>2</sup>, the Trung Son project would not be subject to the default value: but the comparison does show that GHG emissions from the Trung Son reservoir are not an issue.

## PROJECT FINANCIAL ANALYSIS

90. The analysis presented in this section assesses the financial viability of the proposed project. The project is considered to be financially viable if the project owner can derive revenues from its operations that are sufficient to recover all project costs and earn a commercially acceptable return on equity. Financial viability is measured on the basis of the financial internal rate of return (FIRR). FIRR is the discount rate that equalizes the net present value of revenues to the net present value of costs over the entire economic useful life of the project. The FIRR is then compared to the project cost of funds, as estimated by the weighted average cost of capital (WACC). The project is considered financially viable if the FIRR is equal to or greater than the WACC.

91. Project financial viability can also be assessed on the basis of the financial net present value (FNPV). The FNPV is the net financial benefit (revenues less costs) discounted at the WACC over its economic useful life. The project is considered financially viable if the FNPV is equal to or greater than zero. The FNPV will yield the same result as the FIRR in terms of assessing the project as being either financially viable or not viable except that the magnitude of

a project's benefits are inherent in the FNPV. Hence for comparing two projects the FNPV is preferable.

92. The scope of the financial analysis is limited to the project and is undertaken from the perspective of the project owner, which is EVN through the single member company it will establish for the project. Therefore, only those revenues and costs that are directly attributable to the project, and are earned or incurred by the project owner, are considered in this analysis. A summary of the financial analysis of EVN, the project owner, is presented in the next section.

#### Key Assumptions

93. *Project Life.* The financial analysis is undertaken over the project's economic useful life, which includes the project construction period (2011<sup>25</sup> - 2017), two years of partial operations (2016 - 2017), and 39 years of full operations (2018 – 2056).

94. *Price Basis.* The financial benefits and costs employed in the analysis are expressed in Vietnamese dong (VND) in constant January 2011 prices on an after-tax basis.

95. *Income Tax.* The financial analysis is presented on an after-tax basis, meaning that estimated corporate income tax payments are included as a cost to the project. As a result, the FIRR and FNPV are expressed on an after-tax basis. For this reason, the WACC is also expressed on an after-tax basis, meaning the tax shield generated from project debt is incorporated into the WACC calculation. The corporate income tax rate in Vietnam is 25 percent.

96. *Value Added Tax (VAT).* Project costs and revenues are net of VAT. Since EVN receives a refund on its VAT payments, which is offset against its collections of VAT, and this refund is done every quarter, VAT can be excluded.

#### Weighted Average Cost of Capital

97. The WACC is the discount rate used to convert cash flows to a present value basis. The WACC is calculated as the costs of the equity and debt used to finance the project, each weighted by their respective share of the overall project capital structure. In this analysis, two different WACCs are calculated and used as the basis for assessing project financial viability. The difference between the WACCs is the assumed cost of equity ( $R_e$ ) incorporated into the calculation. This is as follows:

- *Scenario A - Estimated Market  $R_e$ .* The WACC is calculated employing an estimated market determined cost of equity. This is estimated using the Capital Asset Pricing Model (CAPM). Based on this approach, the cost of equity is estimated at 21.0 percent in real terms. Using this cost of equity, the WACC is estimated to be just under 6.5 percent, expressed in real terms and on an after-tax basis. This calculation is shown in Part A of Table A9.18
- *Scenario B - Fixed  $R_e$ .* Under the government's draft regulation ("Pricing Methodologies for Determining the Generation Price Bands and Ancillary Services Prices") for the setting of prices of energy produced by new generation facilities, the cost of equity is proposed to be fixed by regulation at 10 percent in real terms. Using this fixed cost of equity, the WACC is calculated as 4.7 percent, in real terms on an after-tax basis, as shown in Part B of Table A9.18.

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<sup>25</sup> The financial analysis is undertaken on the basis of calendar years, which is also the Vietnamese financial year.

98. The estimated cost of equity calculated under Scenario A should be viewed as only an approximation of the actual market rate. However, if the estimate does accurately reflect the actual market rate, the 10 percent rate proposed to be fixed under the price regulation (Scenario B) would yield a below market return to equity holders. This might then limit the supply of equity funds available for the construction of in new generation facilities in Vietnam, particularly from private sources.

**Table A9.18: Calculation of Weighted Average Cost of Capital<sup>1/</sup>**

Source of Funds	% of		Cost of Funds			Inflation	WACC <sup>1/</sup>
	Project Cost	Nominal Prices	Tax Rate	After Tax	Real Prices	Rate	
Scenario A:							
Estimated Market $R_e$							
Equity	15.9%	25.59%	0.00%	25.59%	20.98%	3.82%	3.33%
Onlent IBRD Loan	84.1%	5.57%	25.00%	4.18%	3.72%	0.44%	3.13%
Total	100.0%						6.46%
Scenario B:							
Fixed $R_e$							
Equity	15.9%	14.20%	0.00%	14.20%	10.00%	3.82%	1.59%
Onlent IBRD Loan	84.1%	5.57%	25.00%	4.18%	3.72%	0.44%	3.13%
Total	100.00%						4.72%

<sup>1/</sup>WACC expressed on an after-tax basis in real prices.

99. A review of 55 electric utilities<sup>26</sup> in the United States found that the allowed cost of equity averaged 10.66 percent in 2007, which was equivalent to a real rate of 7.6 percent. Therefore, the 10 percent rate proposed to be fixed for Vietnam is 240 basis points (bp) higher than this US average. However, it does not appear that such a premium would be sufficient to compensate investors for the perceived investment risk differential between the electric utility industries in the two countries. For example, the current yield premium on the 10year Vietnam government US dollar denominated bond relative to the 10 year US Treasury Note is just under 300bp. Since both of these bonds are denominated in US dollars, this yield premium does not capture currency risk. For this reason, the premium required for a Vietnam dong denominated investment, such as the proposed project, should exceed 300bp. Therefore, the 10 percent rate proposed to be fixed by regulation, which provides only a 240 bp premium over comparable investments in the United States, does not appear to fully reflect a market determined rate.

100. A description of the inputs and assumptions employed in calculating the WACC under the alternative costs of equity scenarios is given below.

101. *Capital Structure.* The project capital structure consists of a mix of debt and equity. The project debt is assumed to consist entirely of the proceeds of the proposed IBRD loan. The proposed IBRD loan is assumed to finance 91 percent of the total project cost, net of interest during construction (IDC). After inclusion of IDC, the loan would fund the equivalent of just

<sup>26</sup> *A Comparative Analysis of Return on Equity for Electric Utilities*, June 2008. Prepared by Concentric Energy Advisors for The Coalition of Large Distributors and Hydro One Networks Inc.

over 84 percent of the project cost. The remaining 16 percent of project cost will be financed through an equity contribution from EVN.

102. *Cost of Debt.* The calculation of the estimated cost of debt is given in Table A9.11. For the purposes of the calculation of the WACC, the loan provided by IBRD is assumed to be a US dollar denominated fixed spread loan with a term of more than 14 years. The current interest rate on such a loan is 6 month LIBOR + 115bp. This floating rate is then converted to an equivalent fixed rate basis using the 20 year floating to fixed swap rate, which is presently 4.17 percent. Given the loan is presently proposed to be provided to the Socialist Republic of Vietnam, rather than directly to EVN, the standard 25bp guarantee fee applied by Vietnam's Ministry of Finance (MOF) must also be included. This brings the total fixed rate equivalent cost of debt to 5.57 percent, expressed on a pre-tax basis and in nominal prices. As shown in Table A9.19, this rate is then adjusted for the corporate income tax rate (25 percent) and the projected average annual international inflation rate (0.44 percent) so that the cost of debt can be expressed on an after-tax and real price basis. On this basis, the cost of debt is 3.72 percent.

**Table A9.19: Calculation of Estimated Cost of Debt (pre-tax, nominal prices)**

<b>IBRD Loan – spread over LIBOR</b>	<b>1.15%</b>
MOF Spread over IBRD	0.25%
Swap to Fixed Rate	4.17%
<b>Total Fixed Cost of Debt</b>	<b>5.57%</b>

103. *Estimated Market Cost of Equity.* The market determined cost of equity is estimated at 25.7 percent, expressed in nominal prices (Table A9.20). Adjusted to real prices on the basis of the projected domestic inflation rate, the estimated cost of equity is 21.0 percent. Therefore, the estimated market rate is significantly greater than the 10 percent cost of equity proposed to be fixed under the current draft regulation, as shown in Part B of Table A9.18.

104. The market determined cost of equity incorporated has been estimated on the basis of CAPM, which provides a methodology for estimating the required equity return as a function of the relative risk of the investment. Mathematically, CAPM is expressed as follows:

$$R_e = R_f + \beta_e(R_m - R_f)$$

Where:

$R_e$  = cost of equity

$R_f$  = risk free rate

$R_m$  = expected return on overall equity market

$\beta_e$  = equity beta

105. The cost of equity is the rate of return on a risk free investment ( $R_f$ ), such as government bonds, plus a risk premium appropriate for the project ( $\beta_e(R_m - R_f)$ ). Therefore, the cost of equity for a higher risk project is greater than that having a lower level of risk. Accurately estimating the equity risk premium in any developing country is difficult given that equity markets often lack liquidity and do not have a long track record of operations. Therefore, estimates have been prepared on the basis of data taken from the United States and other countries and then adjusted for application to Vietnam.

**Table A9.20: Calculation of Estimated Cost of Equity (pre-tax, nominal prices)**

<b>Inputs:</b>		
Risk Free Rate ( $R_f$ )	=	11.81%
Market Return over Risk Free Rate ( $R_m - R_f$ )	=	6.25%
Equity Beta ( $\beta_e$ )	=	2.21
Calculation of Cost of Equity ( $R_e$ ):		
$R_e = R_f + \beta_e(R_m - R_f)$		
$R_e = 11.81\% + 2.21(6.25\%)$	=	25.59%

106. *Risk Free Rate ( $R_f$ )*. The risk free rate is taken as the current yield on the 10 year Government of Vietnam domestic currency bond, which is 11.81 percent.

107. *Market Return over Risk Free Rate ( $R_m - R_f$ )*. The expected market return ( $R_m$ ) in excess of the risk free rate ( $R_f$ ) is derived from the historical return on the New York Stock Exchange (NYSE) relative the US risk free rate, as estimated by the US 10 year Treasury Note. This provides a market return over the risk free rate of about 5 percent. This is then multiplied by 1.25 to approximate the relatively higher risk environment of equity markets in Vietnam. Therefore, the market return over the risk free rate ( $R_m - R_f$ ) in Vietnam is assumed to be 6.25 percent.

108. *Equity Beta ( $\beta_e$ )*. Equity beta is a measure of a stock's volatility in relation to the overall market. By definition, the market has a beta of 1.0, and individual stocks are ranked according to their volatility relative to the market. Therefore, an equity beta of more than 1.0 indicates a greater level of volatility than the overall market. Given the same capital structure, electric utilities tend to have lower equity betas than the overall market.

109. The equity beta is estimated on the basis of actual equity betas for 81 electric utilities; 64 in the United States, 11 non-US utilities whose shares are traded on US exchanges, and three publicly listed independent power producers (IPPs) in Thailand. To remove the impact of corporate leverage, the equity beta for each firm is converted to an asset beta. The average asset beta for the 78 US traded utilities is 0.33, while the average asset beta for the three Thai IPPs is 0.36. On this basis, the asset beta for the project is assumed to be 0.35. When adjusted for leverage, based on the proposed project capital structure, the equity beta ( $\beta_e$ ) is 2.21.

#### Project Costs

110. Project costs consist of: (i) capital costs; (ii) equipment refurbishment costs (iii) operating and maintenance costs; (iv) natural resource tax; and, (v) corporate income taxes. Each of these is described briefly below.

111. *Capital Costs*. The estimated project capital cost is VND 6,606 billion (\$349 million) as given in Table A9.21. For the purposes of the financial analysis, the project cost is the baseline cost plus physical contingencies. Price contingencies and IDC are excluded. The cost estimates given in Table A9.21 were prepared as part of the project feasibility study prepared by PECC4, originally issued in September 2008 and updated to January 2011. The project costs have been prepared by PECC4 in Vietnamese Dong. Imported project inputs have been converted to Vietnamese Dong on the basis of a VND/US\$ exchange rate of 18,932.

112. The project costs given in Table A9.21 are net of VAT, which is estimated at VND 408 billion (\$21 million) on baseline costs and physical contingencies. As noted earlier, since EVN is refunded its VAT payments on a quarterly basis, it can be excluded.

**Table A9.21: Estimated Project Capital Costs<sup>1/</sup>**

<i>Project Component</i>	<i>VND billion</i>	<i>\$ million equivalent<sup>2/</sup></i>
1. Dam & Ancillary Construction		
1.1 Dam & Appurtenant Structures	3,789.8	200.2
1.2 Access Roads & Bridges	477.3	25.2
1.3 Power Supply	46.1	2.4
Total	4,313.2	227.8
2. Transmission Line	352.3	18.6
3. Social & Environmental Impact Management		
3.1 Resettlement	614.6	32.5
3.2 Health Support	11.4	0.6
3.3 Environmental Management	45.5	2.4
Total	671.5	35.5
4. Project Management	663.2	35.0
5. Other Costs		
5.1 Technical Assistance to EVN	56.8	3.0
5.2 Unallocated Amount	233.4	12.3
Total	290.2	15.3
Baseline Cost	6,290.5	332.3
6. Physical Contingencies	315.3	16.7
Total Cost <sup>3/</sup>	6,605.9	348.9

<sup>1/</sup>Project costs prepared by PECC4 as issued 26 September 2008, and updated to January 2011.

<sup>2/</sup>VND costs converted to equivalent US dollars at exchange rate of VND 18,932.

<sup>3/</sup>Total cost excluding price contingencies and interest during construction.

113. *Equipment Refurbishments.* A provision for refurbishment of major equipment items is made and included in the project cash flows. This provision is set at VND 735 billion (\$38 million), expressed on a year end 2010 price basis, in each of Years 19 and 20 of operations.

114. *Operating and Maintenance Cost.* For the purposes of the financial analysis, this includes operating and maintenance costs as well as a provision for routine equipment overhauls and replacements. Only cash expenditures on operations and maintenance costs are relevant to the financial analysis. Therefore, non-cash items, such as depreciation expense, are excluded. On this basis, operating and maintenance costs are assumed to be equivalent to 1.5 percent of the project capital cost.

115. *Natural Resource Tax.* The analysis includes payments of the natural resource tax which is applied to hydropower facilities in Vietnam. The tax is applied at 2 percent of the average retail electricity tariff multiplied by retail energy sales from the hydropower facility. Retail energy sales are calculated as generation less estimated system losses. The average retail



electricity tariff was at appraisal VND 1,058/kWh and, for the purposes of this analysis, is assumed to increase at a real rate of 0.5 percent per year over the forecast period. System losses are presently estimated at just over 10 percent and are assumed to gradually decline to just over 8 percent over the forecast period.

### Project Revenues

116. For the purposes of the financial analysis, project revenues are assumed to be derived entirely from the sale of electricity. While the project may also earn revenue from ancillary services, such as the sale reserve, this is likely to be insignificant in comparison to energy sales and is, therefore, not considered here.

117. *Pricing.* Energy produced by the project will be priced in accordance with the evolving market design for the development of a competitive generation market in Vietnam. A power purchase agreement (PPA) covering a 10 year period would be signed with the Single Buyer for the purchase of the energy output of the project. Under the existing draft regulations, an energy only price will be set for output from new hydro facilities within a range set by the Electricity Regulatory Authority of Vietnam (ERAV) for standard PPAs.

118. For the purposes of the financial analysis, the price is set at the minimum level required to make the project financially viable. This means setting the price at a level necessary to achieve an FIRR for the project that just equals the WACC. Setting the price at this level will also mean that the FNPV will be zero, which is threshold of financial viability. Since this analysis employs two alternative estimates of WACC estimates, two alternative prices are calculated.

119. *Energy Output.* The contracted energy output is based on that estimated under average hydrological conditions. Based on a reservoir simulation undertaken as part of the feasibility analysis of the project, this is estimated to be 1,019GWh per year.

120. Under the current draft pricing regulation, the generator bears hydrological risk. Therefore, should actual energy output fall short of that contracted, the project will need to cover the resulting shortfall by purchasing energy on the spot market. Alternatively, should energy output be greater than that contracted, the project can sell this surplus energy at the prevailing market price. For the purposes of the base case financial analysis, it is assumed that there are no shortfalls or surpluses in energy output.

### Financial Analysis Results

121. The energy price required to achieve the minimum threshold of financial viability is calculated under two alternative WACCs. These WACCs differ only in terms of the assumed cost of equity (Re). As shown in Table A9.22, Scenario B assumes that the cost of equity is set at the estimated market rate of 21.0 percent in real terms. Under Scenario B, the cost of equity is fixed by regulation at 10 percent, also expressed in real terms. This then leads to two different WACCs; 6.5 percent under Scenario A and 4.7 percent under Scenario B.

**Table A9.22: Financial Analysis - Summary Results**

Indicator	Scenario A	Scenario B
	Estimated Market $R_e$	Fixed $R_e$
$R_e$ (%)	21.0%	10.0%
FIRR (%)	6.5%	4.7%
FNPV (VND billion)	0	0
Energy Price (VND/kWh)	753	607

122. *FIRR & FNPV.* Since the analysis has been undertaken to determine the minimum threshold of financial viability, the energy price is calculated so that FIRR just equals WACC. Therefore, under Scenario A, the FIRR is 6.5 percent, while under Scenario B, the FIRR is 4.7 percent (Table A9.14). Similarly, the FNPV under both scenarios is zero, meaning that the energy price has been set to make the project financially viable, but only just so.

123. *Price.* Given that the cost of equity is set at the estimated market rate, as under Scenario A, the minimum energy price required to achieve financial viability is estimated at VND 753/kWh, expressed in real terms. Based on the VND/US\$ exchange rate in February 2011, this is equivalent to 3.52¢/kWh. Alternatively, if the cost of equity can be fixed by regulation at 10 percent, as under Scenario B, the minimum required price is estimated at VND 607/kWh, equivalent to 2.91¢/kWh.

124. Even at the higher price of VND 753/kWh, as under Scenario A, the project appears to be competitive with other existing and planned generation facilities in Vietnam. Prices for existing facilities selling to EVN presently range from about VND 550/kWh to VND 750/kWh. The estimated price for a hydro project completed in 2009, which has output similar to Trung Son, was initially set at about VND 650/kWh.

125. The Scenario B tariff is about 10 percent above the lower end of price range noted above for existing facilities selling energy to EVN and about 7 percent lower than the VND 650/kWh price noted above for a recently completed hydro project. However, Scenario A is assessed as providing the more realistic indication of the tariff required to ensure the commercial viability of the project.

#### Sensitivity Analysis

126. An analysis is undertaken to test the sensitivity of FIRR and FNPV to changes in selected key variables above and below their estimated values. The variables tested are: (i) changes in project capital costs; and, (ii) changes in energy output resulting from changes in hydrological conditions. The analysis is undertaken on the basis of Scenario A described earlier, meaning that the WACC is set at 6.5 percent on the basis of an estimated market determined cost of equity. The results of the sensitivity analyses are summarized below.

127. The impact of changes in project costs on FIRR and FNPV is assessed using Monte Carlo analysis, the results of which are summarized in Tables A9.23 and A9.24. The analysis assumes a triangular distribution of possible project costs, in which the maximum is set at 30 percent above the base case estimate of VND 6,606 billion (Table A9.23), while the minimum is set at 15 percent below this base case estimate.

**Table A9.23: Changes in Project Costs – Probability Distribution**

	10 <sup>th</sup>	20 <sup>th</sup>	30 <sup>th</sup>	40 <sup>th</sup>	50 <sup>th</sup>	60 <sup>th</sup>	70 <sup>th</sup>	80 <sup>th</sup>	90 <sup>th</sup>
FIRR	5.2%	5.5%	5.7%	6.0%	6.1%	6.3%	6.5%	6.7%	7.0%
FNPV <sup>1/</sup>	(975)	(730)	(546)	(369)	(223)	(85)	36	167	336

<sup>1/</sup> Expressed in VND billion in constant 2010 prices.

128. Table A9.23 shows an estimated probability distribution for FIRR and FNPV given changes in project costs. This gives the estimated FIRR and FNPV for each percentile in the distribution of results generated by the Monte Carlo simulation. For example, the 20th percentile values for FIRR and FNPV are 5.5 percent and –VND 730 billion respectively. These represent the values for FIRR and FNPV that are equal to or higher than 20 percent of the results observed during the simulation. Put another way, there is an 80 percent probability that the FIRR and FNPV will be greater than 5.5 percent and –VND 730 billion.

129. The probability distribution indicates the likely range of FIRR and FNPV resulting from changes in project costs above and below the base case estimate of VND 6,606 billion. An increase in project costs above this amount will result in a reduction in the FIRR and FNPV below their base case estimates of 6.5 percent and zero, as given in Table A9.22. Alternatively, should project costs be lower than estimated, FIRR and FNPV will be higher. Based on the probability distribution shown in Table A9.23, it can be concluded that there is an 80 percent probability that any changes in project costs will yield an FIRR of between 5.2 percent and 7.0 percent. Similarly, there is an 80 percent probability that FNPV will be between a low of –VND 975 billion and a high of VND 336 billion.

130. Table A9.24 takes this same probability distribution and uses it as the basis for estimating the probabilities of achieving specific targeted FIRRs. For example, the simulation estimates that, despite possible changes in project costs, there is a 100 percent probability of achieving an FIRR of 4.0 percent or higher. At the other end of the distribution, it is estimated that there is a 0 percent probability of achieving an FIRR of 8.0 percent or higher. This absolute probability is due to the triangular distribution assumed for project cost over-runs and under-runs.

**Table A9.24: Changes in Project Costs – Probability Distribution**

Target FIRR	4.0%	5.0%	6.0%	6.5%	7.0%	8.0%
Probability	100.0%	95.3%	57.4%	30.7	9.5%	0.0%

131. The estimated probability that the FIRR is at least that estimated under the base case (Scenario A) FIRR, 6.5 percent, is 31 percent. The reason the probability of achieving at least this base case FIRR is less than 50 percent is because of the assumption of a triangular distribution of possible project costs. Under this distribution, the probability of a cost over-run is assumed to be significantly greater than that for a cost under-run.

### ***Impact of delays***

132. The impact of delays in construction completion on financial returns was assessed on the basis of the same scenarios employed in the economic analysis. Under the base case, which assumes no delay, the energy price required to achieve the minimum threshold of financial viability is calculated as VND 753/kWh. If the project is delayed by one year after 5 years of construction, the required energy price increases by 5 percent, to VND 790/kWh. However, if

this one year delay occurs after the second year, the impact is less significant; the required energy price is VND 770/kWh, an increase of just over 2 percent.

133. If the delays also increase the project cost, which is likely, the impact is somewhat greater. If a one year delay after 5 years of construction results in a 5 percent increase in project cost, the energy price would need to be set at a minimum of VND 829/kWh, which is 10 percent higher than the base case. If the one year delay occurs after the second year, and the cost increase is also 5 percent, the required energy price is VND 813/kWh, or 8 percent higher than the base case.

134. Longer delays that cause larger cost over-runs will have a greater impact on the required energy price. For example, a two year delay after 5 years of construction that causes project costs to increase by 10 percent would require the energy price to be set at a minimum of VND 912/kWh, a 21 percent increase over the base case.

#### FINANCIAL ANALYSIS OF TSHPCo

135. A financial analysis of TSHPCo is undertaken in order to assess its financial performance over the 2011 – 2056 economic life of the TSHPP. Financial projections are presented for the company in Tables A9.25 – A9.28 for the first 20 years of the operation of the company (2011 – 2030). The projections consist of financial statements for TSHPCo, which are given in Tables A9.26 – A9.28, and based on these financial statements, key financial indicators for the company over the forecast period are presented in Table A9.25.

136. *Scope of Analysis.* The projections incorporate all operating revenue and expenses, capital investments, loan repayments and borrowings estimated to be incurred by TSHPCo over the forecast period. Since the scope of the company is limited to the construction and operation of the TSHPP, all revenues and expenditures earned and incurred by the company relate entirely to this project. Operating revenues consist entirely of project energy sales while recurrent expenses are limited to those for the operation and maintenance of the project. Similarly, capital expenditures are limited to that for the initial construction of TSHPP, as well as subsequent replacements of equipment over the life of the facility. Debt consists entirely of the on lent proceeds of the IBRD loan.

137. In addition to those cash outflows to cover operations and maintenance expenses and debt service, the company would also pay out dividends to its shareholders. Since it is presently assumed that the scope of the company is limited to the TSHPP, there is no need to retain profits for investment in other projects or businesses. Instead, the need to retain profits is limited to the maintenance of a cash reserve in order to ensure that the company can meet its financial obligations despite any adverse changes in revenues or costs. On this basis, the projections assume that TSHPCo would begin dividend payments in 2020. Any surplus cash above the reserve requirement would be paid out in dividends. The reserve requirement is to maintain a cash balance equal to six months' worth of total cash expenditures on operations and maintenance, taxes, and debt service.

138. *Profitability.* The projections indicate TSHPCo should be profitable in all years over the life of the project with the possible exception of 2019, in which net losses of VND 27 billion (\$1 million) and VND 4 billion (\$0.2 million) are projected (Table A9.26). These losses are due to interest expense and the anticipated foreign exchange loss on the company's debt. With loan repayments just beginning, interest expense is high in 2018, about VND 322 billion (\$13

million). Furthermore, under Vietnamese regulations, foreign exchange losses incurred during project construction are deferred and recognized over the first five years after construction completion, which would be the period from 2018 to 2022. Given a modest but continual depreciation of the VND, the loss that would be recognized in 2018 is estimated at VND 380 billion (\$15 million). However, because this foreign exchange loss is largely unrealized, meaning it related to debt not yet due, it would not have a significant impact on cash flows in 2018. Furthermore, the projected overall net loss is modest in relation to operating revenue, which is projected at VND 1,198 billion (\$48 million) in 2018.

139. Over the remainder of the forecast period, profits are projected to be stable and gradually increase in line with increases in the energy tariff. The return on net fixed assets (RNFA) is projected to increase from -0.1 percent in 2019 to 18.2 percent by 2030. The improvement in the return on equity (ROE) is projected to be even more significant, increasing from -0.4 percent in 2019 to 68 percent in 2030. These large increases reflect the single project scope of the company's operations. With only one project, the net book value of the company's fixed assets gradually decline over time, which increases the RNFA. As noted above, with only one project, additional investment requirements are very limited, meaning that a large share of profits can be paid out to shareholders rather than being retained for reinvestment. With profits being paid out, the company's equity balance remains relatively stable, which means that ROE improves significantly as net profit increases.

140. *Cash Flows & Liquidity.* The company is projected to earn a positive net cash flow in all years over the project operating life (Table A9.27). As noted above, surplus cash would be paid out as dividends, subject to the requirement to maintain an adequate cash reserve. Therefore, after payment of the dividend, the cash balance would remain relatively stable in order to cover this reserve requirement. The shorter-term liquidity position of the company should be satisfactory in all years. The current ratio, the ratio of current assets to current liabilities, is expected to range between 1.3 and 2.5 over the 2017 – 2030 period, which is considered adequate (Table A9.25).

141. *Debt Service.* The largest cash expenditure in each year over the 2018 – 2030 period is for the repayment of debt and the interest expense on this debt. In 2018, total debt service is estimated at VND 735 billion (\$29 million) (Table A9.27). Given the assumption of a constant principal repayment loan, debt service, expressed in US dollar terms, would then gradually decline in each year thereafter. However, when converted to dong, because of the projected depreciation of the dong against the dollar, debt service would increase by about 10 percent between 2018 and 2021 and then gradually decline thereafter. The ability of the company to service this debt is measured by the debt service coverage ratio (DSCR) (Table A9.25). The DSCR is projected to be satisfactory in all years, although in some of initial years of loan repayment, such as 2018, the DSCR may be near the bottom end of the range typically considered satisfactory. Tailoring repayments during this initial period so that debt service is reduced would ensure that debt service capacity is maintained within this satisfactory range.

142. Since all debt is denominated in US dollars, actual debt service in VND equivalent will vary depending on the exchange rate in each year over the forecast period. The ability to mitigate this exchange rate exposure by converting future foreign currency loan obligations into VND is presently limited. However, as the Vietnamese financial market continues to develop, it is likely that suitable hedging mechanisms, such as swaps and forwards, will become available over the repayment period of the loan. Mechanisms for hedging US dollar exposure will probably develop

earlier and more rapidly than for other foreign currencies. Furthermore, since the VND is managed primarily in relation to the US dollar, the volatility of the VND/\$ exchange rate is normally less than that for other foreign currencies. Therefore, foreign exchange exposure is lower.

143. *Debt.* TSHPCo's total debt peaks at VND 8,135 (\$330 million) in 2017, just before principal repayments begin in 2018 (Table A9.28). By 2030, debt would be less than half this original amount, VND 3,925 billion (\$115 million). As a result, the degree of leverage in the company capital structure will be progressively reduced. The debt to equity ratio is projected to decline from 90:10 in 2017 to 75:25 by the end of 2030 (Table A9.25).

**Table A9.25: Trung Son Hydropower Company – Key Performance Indicators**  
(VND billion at nominal prices)

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
<b>Profitability</b>																				
Operating Margin (%)	-	-	-	-	-	70%	56%	56%	58%	59%	60%	61%	62%	63%	64%	64%	68%	70%	70%	71%
Return on Equity (%)	0.0%	0.0%	0.0%	0.0%	0.0%	1.6%	28.6%	-2.9%	-0.4%	3.7%	14.4%	33.3%	65.9%	75.8%	82.9%	86.3%	89.1%	82.2%	74.6%	68.2%
Return on Net Fixed Assets	-	-	-	-	-	0.3%	2.8%	-0.3%	-0.1%	0.4%	1.1%	2.4%	4.9%	6.1%	7.4%	8.9%	11.4%	13.5%	15.7%	18.2%
<b>Liquidity &amp; Capital Structure</b>																				
Current Ratio	-	-	-	-	-	107.5	1.3	1.9	2.5	1.4	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Cash Balance (VND billions)	2	2	2	2	2	16	446	700	976	531	550	580	591	603	616	635	650	663	677	691
Debt:Equity Ratio	48:52	67:33	77:23	85:15	88:12	91:9	90:10	89:11	87:13	93:7	94:6	93:7	93:7	93:7	92:8	90:10	88:12	84:16	80:20	75:25
<b>Debt Service</b>																				
Debt Service Coverage Ratio	0.00	0.00	0.00	0.00	0.00	0.06	2.56	1.38	1.36	1.37	1.40	1.43	1.43	1.47	1.53	1.58	1.62	1.68	1.75	1.82

**Table A9.26: Trung Son Hydropower Company – Projected Income Statements**  
(VND billion at nominal prices)

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
<b>Operating Revenue</b>																				
Sales Revenue	0	0	0	0	0	24	934	1,198	1,257	1,320	1,386	1,449	1,507	1,567	1,629	1,695	1,762	1,833	1,906	1,982
<b>Operating Expenses</b>																				
Operations & Maintenance	0	0	0	0	0	3	121	155	162	171	179	187	195	202	210	219	228	237	246	256
Natural Resources Tax	0	0	0	0	0	1	25	32	34	36	38	40	41	43	45	47	49	52	54	56
Depreciation	0	0	0	0	0	4	269	336	336	336	336	336	336	336	336	336	283	270	270	270
Total	0	0	0	0	0	7	415	523	533	543	553	563	572	582	592	602	560	558	570	583
Interest Expense	0	0	0	0	0	0	200	322	355	378	368	355	341	325	309	292	274	254	234	213
Foreign Exchange Loss (Gain)	0	0	0	0	0	0	0	380	374	368	362	308	156	148	141	132	124	114	105	94
Net Profit before Tax	0	0	0	0	0	17	319	(27)	(4)	31	104	222	438	511	588	668	806	906	997	1,092
Income Tax	0	0	0	0	0	4	80	0	0	0	26	56	109	128	147	167	201	226	249	273
Net Profit after Tax	0	0	0	0	0	12	239	(27)	(4)	31	78	167	328	383	441	501	604	679	748	819

**Table A9.27: Trung Son Hydropower Company – Projected Cash Flow Statements**  
(VND billion at nominal prices)

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
<b>Operating Cash Flows</b>																				
Sales Receipts	0	0	0	0	0	22	859	1,176	1,253	1,315	1,381	1,443	1,502	1,562	1,624	1,689	1,757	1,827	1,900	1,976
Operating Expenditures	0	0	0	0	0	(3)	(124)	(156)	(163)	(171)	(179)	(187)	(195)	(203)	(211)	(219)	(228)	(237)	(247)	(256)
Natural Resources Tax Paid	0	0	0	0	0	(1)	(25)	(32)	(34)	(36)	(38)	(40)	(41)	(43)	(45)	(47)	(49)	(52)	(54)	(56)
Income Tax Paid	0	0	0	0	0	(4)	(80)	0	0	(0)	(26)	(56)	(109)	(128)	(147)	(167)	(201)	(226)	(249)	(273)
Net Cash from Operations	0	0	0	0	0	14	631	988	1,056	1,109	1,138	1,161	1,156	1,188	1,221	1,256	1,278	1,312	1,350	1,390
<b>Investing Cash Flows</b>																				
Capital Costs	(724)	(1,139)	(1,195)	(1,287)	(1,421)	(1,974)	(331)	0	0	0	0	0	0	0	0	0	0	0	0	0
Interest During Construction	(2)	(19)	(57)	(110)	(174)	(253)	(77)	0	0	0	0	0	0	0	0	0	0	0	0	0
Net Cash from Investments	(726)	(1,158)	(1,252)	(1,397)	(1,595)	(2,227)	(407)	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Financing Cash Flows</b>																				
Equity Injections	387	268	135	86	159	241	77	0	0	0	0	0	0	0	0	0	0	0	0	0
Loan Drawdowns	341	890	1,117	1,311	1,436	1,985	330	0	0	0	0	0	0	0	0	0	0	0	0	0
Principal Repayments	0	0	0	0	0	0	0	(413)	(425)	(438)	(450)	(462)	(473)	(484)	(495)	(506)	(518)	(530)	(542)	(554)
Operating Interest Paid	0	0	0	0	0	0	(200)	(322)	(355)	(378)	(368)	(355)	(341)	(325)	(309)	(292)	(274)	(254)	(234)	(213)
Dividends Paid	0	0	0	0	0	0	0	0	0	(738)	(300)	(314)	(331)	(367)	(405)	(438)	(472)	(514)	(561)	(609)
Net Cash from Financing	728	1,158	1,252	1,397	1,595	2,227	207	(735)	(780)	(1,554)	(1,118)	(1,131)	(1,144)	(1,176)	(1,209)	(1,236)	(1,264)	(1,299)	(1,337)	(1,376)
<b>Net Cash Flows</b>																				
Change in Cash	2	0	0	0	0	14	430	253	276	(445)	19	30	12	12	12	19	15	13	14	14
Ending Cash Balance	2	2	2	2	2	16	446	700	976	531	550	580	591	603	616	635	650	663	677	691

**Table A9.28: Trung Son Hydropower Company – Projected Balance Sheets**  
(VND billion at nominal prices)

	2,011	2,012	2,013	2,014	2,015	2,016	2,017	2,018	2,019	2,020	2,021	2,022	2,023	2,024	2,025	2,026	2,027	2,028	2,029	2,030
<b>Assets</b>																				
<b>Current Assets</b>																				
Cash	2	2	2	2	2	16	446	700	976	531	550	580	591	603	616	635	650	663	677	691
Accounts Receivable	0	0	0	0	0	2	77	98	103	109	114	119	124	129	134	139	145	151	157	163
Inventory	0	0	0	0	0	0	10	13	13	14	15	15	16	17	17	18	19	19	20	21
Total	2	2	2	2	2	18	533	811	1,092	653	679	714	731	749	767	792	813	833	854	875
<b>Non-Current Assets</b>																				
Construction in Progress	726	1,884	3,136	4,533	6,128	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Net Fixed Assets	0	0	0	0	0	8,352	8,490	8,154	7,817	7,481	7,145	6,809	6,473	6,136	5,800	5,464	5,182	4,911	4,641	4,371
Total	726	1,884	3,136	4,533	6,128	8,352	8,490	8,154	7,817	7,481	7,145	6,809	6,473	6,136	5,800	5,464	5,182	4,911	4,641	4,371
<b>Total Assets</b>	728	1,886	3,138	4,535	6,130	8,370	9,023	8,965	8,910	8,134	7,824	7,523	7,204	6,885	6,567	6,256	5,995	5,745	5,495	5,246
<b>Liabilities &amp; Equity</b>																				
<b>Current Liabilities</b>																				
Current Portion LT Debt	0	0	0	0	0	0	407	419	431	444	457	468	478	489	501	512	524	536	548	561
Accounts Payable	0	0	0	0	0	0	7	8	9	9	10	10	11	11	12	12	12	13	13	14
Total	0	0	0	0	0	0	413	427	440	453	467	478	489	500	512	524	536	549	562	575
<b>Non-Current Liabilities</b>																				
Long Term Debt	348	1,261	2,431	3,833	5,403	7,577	7,729	7,538	7,330	7,102	6,855	6,545	6,218	5,871	5,506	5,120	4,714	4,287	3,837	3,364
<b>Equity</b>																				
Shareholder Capital	387	655	791	877	1,036	1,277	1,355	1,355	1,355	1,355	1,355	1,355	1,355	1,355	1,355	1,355	1,355	1,355	1,355	1,355
Retained Earnings	0	0	0	0	0	12	252	225	221	(486)	(708)	(855)	(858)	(841)	(805)	(743)	(610)	(446)	(258)	(48)
Exchange Loss Reserve	(7)	(30)	(84)	(174)	(309)	(497)	(726)	(581)	(436)	(290)	(145)	0	0	0	0	0	0	0	0	0
Total	381	625	707	702	727	793	881	999	1,140	579	502	500	497	514	550	612	744	909	1,096	1,307
<b>Total Liabilities &amp; Equity</b>	728	1,886	3,138	4,535	6,130	8,370	9,023	8,965	8,910	8,134	7,824	7,523	7,204	6,885	6,567	6,256	5,995	5,745	5,495	5,246



## FINANCIAL ANALYSIS OF EVN

144. This section summarizes the key findings of the financial analysis of Vietnam Electricity (EVN). This analysis provides an assessment of EVN's financial results for 2009 based on its audited IFRS<sup>27</sup> financial statements for the year as well as other supporting financial and operating data.<sup>28</sup>

145. EVN's financial performance in 2009 improved significantly over that in 2008, but was still unsatisfactory. EVN incurred a net loss in 2009, primarily due to the large foreign exchange loss on its foreign currency debt. The net loss for the year was VND 1,433 billion (\$84 million)<sup>29</sup> on sales of VND 78,968 billion (\$4.61 billion). However, EVN's financial performance was substantially better in 2009 than in 2008. In 2008, the net loss was VND 7,319 billion (\$442 million), five times larger than that in 2009. The much lower net loss in 2009 was due to two main factors. First, the foreign exchange loss incurred in 2009 was over 40 percent less than that in 2008. Second, electricity tariffs were increased in March 2009, while in 2008, there was no increase in tariffs.

146. The foreign exchange loss in 2009 was VND 5,902 (\$329 million), almost all of which was incurred on EVN's Japanese Yen and US Dollar debt. In 2008, the foreign exchange loss was much larger, VND 10,126 billion (\$596 million), because of the more significant depreciation of the Dong against the Yen in that year. However, since the foreign exchange losses in both years were almost entirely unrealized, meaning that they were incurred on the principal amount of EVN debt due in future years, these losses had a negligible impact on cash flows in the current year. As a result, EVN's overall net cash flow for 2009 was relatively healthy, VND 6,715 billion (\$392 million), which increased the cash balance to VND 18,576 billion (\$1.04 billion) by year-end. However, despite this significant increase in cash holdings, EVN's overall short-term liquidity position did not improve in 2009. The reason for this was that the increase in cash was largely offset by an increase in short-term obligations.

147. Covenant Compliance in 2009. EVN met the three main financial covenants agreed to between EVN and the International Development Association (IDA). However, for the debt service covenant, EVN could only meet the level to which it was waived by the Bank for 2009. The debt-service coverage ratio (DSCR) was 1.1, above the waived covenant minimum of 1.0, but below the 1.5 established under the original covenant. The self-financing ratio (SFR) was 32 percent, above the original covenant minimum of 25 percent and well above the 15 percent minimum agreed to for 2009. EVN also met the debt:equity covenant although the margin of compliance was narrow. The debt to equity ratio at the end of 2009 was 68:32, just below the 70:30 maximum set under the covenant.

148. EVN's audited IFRS financial statements for 2009 are given in Tables A9.26, A9.30 and A9.31 with comparative figures for 2005 – 2008. Key performance indicators derived from the financial data for this five year period are summarized in Table A9.32.

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<sup>27</sup> International Financial Reporting Standards.

<sup>28</sup> This summarizes a more detailed review in World Bank, *Financial Analysis of Vietnam Electricity* (EVN), October 2010.

<sup>29</sup> Conversion from VND to US dollars made using average exchange rates for income and cash flow figures and year-end rates for balance sheet figures. Average exchange rates are 16,570 (2008) and 17,119 (2009). Year-end rates are State Bank of Vietnam inter-bank averages; 16,977 (2008) and 17,941 (2009).

149. At appraisal no audited data were available for 2010, but it is understood that EVN incurred losses in the first half of the year, mainly the result of having to use expensive fossil-fueled plant to replace hydropower that was not able to run owing to the unusually dry conditions and to meet a government mandate to minimize load shedding. In 2010, a further tariff increase of about 6.8 percent was agreed and became effective in March but this did not include a mechanism to compensate for changes in fuel mix. Despite this relatively poor performance, EVN is expected to have sufficient cash to permit it to meet its obligations to TSHPCo comfortably.

**Table A9.29 EVN income statements**

(VND billion at nominal prices)

	2005	2006	2007	2008	2009
Net Sales Revenue	37,274	43,766	57,003	63,732	78,975
Cost of Sales	(32,020)	(36,865)	(47,137)	(54,593)	(66,493)
Gross Profit	5,254	6,901	9,866	9,139	12,482
Investment Revenue	0	659	1,202	1,569	1,356
Selling Expenses	(811)	(1,307)	(1,758)	(2,273)	(2,724)
Administration Expenses	(1,784)	(2,114)	(2,594)	(3,010)	(3,883)
Other Operating Income	3,111	547	627	1,277	1,342
Other Operating Expenses	(127)	(791)	(1,590)	(10,592)	(6,173)
Operating Profit	5,642	3,894	5,753	(3,890)	2,400
Finance Cost	(1,608)	(1,847)	(2,304)	(3,047)	(3,457)
Profit before Tax	4,034	2,048	3,449	(6,937)	(1,057)
Income Tax	(1,195)	(355)	(859)	(382)	(376)
Net Profit after Tax	2,840	1,692	2,590	(7,319)	(1,433)

<sup>1/</sup> Based on audited IFRS data.

**Table A9.30: EVN - Balance Sheets**(VND billion - nominal prices)<sup>1/</sup>

	2005	2006	2007	2008	2009
<b>Current Assets</b>					
Cash	9,440	12,384	13,278	11,861	18,576
Short-Term Investments	3,389	6,045	8,546	4,890	6,918
Receivables	7,961	10,280	13,856	15,339	15,537
Other Current Assets	4,674	5,774	6,174	7,654	7,354
<b>Total</b>	<b>25,464</b>	<b>34,484</b>	<b>41,853</b>	<b>39,744</b>	<b>48,384</b>
<b>Non-Current Assets</b>					
Net Fixed Assets	64,775	68,592	92,548	92,104	121,754
Construction in Progress	17,995	28,275	37,245	54,642	61,074
Construction Materials & Supplies	5,735	5,187	8,071	10,705	0
Other Non-Current Assets	601	1,018	4,982	6,997	22,200
<b>Total</b>	<b>89,106</b>	<b>103,072</b>	<b>142,847</b>	<b>164,448</b>	<b>205,029</b>
<b>Total Assets</b>	<b>114,569</b>	<b>137,556</b>	<b>184,700</b>	<b>204,192</b>	<b>253,413</b>
<b>Current Liabilities</b>					
Payables	11,160	13,807	17,040	20,136	26,152
Short-Term Loans	857	775	1,077	936	1,345
Current Portion of Long-Term Debt	4,082	4,985	6,467	8,582	12,559
Other Current Liabilities	908	981	1,884	2,167	4,119
<b>Total</b>	<b>17,007</b>	<b>20,548</b>	<b>26,468</b>	<b>31,821</b>	<b>44,175</b>
<b>Non-Current Liabilities</b>					
Long-Term Debt	49,623	63,526	81,157	107,543	139,132
Other Non-Current Liabilities	233	221	212	296	276
<b>Total</b>	<b>49,856</b>	<b>63,746</b>	<b>81,369</b>	<b>107,839</b>	<b>139,407</b>
<b>Equity</b>					
Equity Holders of the Parent	46,951	51,214	73,174	61,310	64,670
Minority Interest	756	2,048	3,689	3,223	5,160
<b>Total</b>	<b>47,707</b>	<b>53,262</b>	<b>76,863</b>	<b>64,533</b>	<b>69,830</b>
<b>Total Liabilities &amp; Equity</b>	<b>114,569</b>	<b>137,556</b>	<b>184,700</b>	<b>204,192</b>	<b>253,413</b>

<sup>1/</sup> Based on audited IFRS data.

**Table A9.31: EVN - Cash Flow Statements**(VND billion - nominal prices)<sup>1/</sup>

	2005	2006	2007	2008	2009
<b>Cash Flows from Operating Activities</b>					
Net Profit after Tax	2,840	1,692	2,590	(7,319)	(1,433)
Adjustments	8,726	12,342	14,229	24,687	22,772
(Increase) / Decrease in Working Capital	(182)	(258)	(12)	1,071	11,462
Interest Paid	(1,527)	(1,706)	(2,105)	(6,021)	(632)
Income Tax Paid	(434)	(669)	(369)	(1,116)	(8,062)
Net Cash Flow	9,421	11,401	14,335	11,302	24,108
<b>Cash Flows from Investing Activities</b>					
Capital Assets & Construction Costs	(18,741)	(20,906)	(29,076)	(32,339)	(47,230)
(Increase) / Decrease in Investments	(3,609)	(3,011)	(3,323)	2,578	244
Payments to Acquire Financial Assets	0	0	(1,490)	(533)	244
Proceeds from Investing Activities	543	644	984	1,569	1,839
Proceeds from Equitization	1,318	180	4,554	1,106	471
Other Proceeds	43	516	(4,468)	(4,135)	(3,509)
Net Cash Flow	(20,447)	(22,577)	(32,820)	(31,754)	(47,941)
<b>Cash Flows from Financing Activities</b>					
New Loans	12,323	18,988	24,941	28,098	42,143
Loan Repayment	(4,058)	(4,874)	(6,420)	(9,282)	(12,335)
Capital Injected	(32)	(121)	1,173	448	782
Dividends Paid	0	0	(272)	(231)	(42)
Other	0	127	0	0	0
Net Cash Flow	8,234	14,120	19,422	19,035	30,548
Net Increase in Cash	(623)	(2,792)	937	(1,417)	6,715
Cash at Beginning of Year	12,855	12,232	12,341	13,278	11,861
Cash at End of Year	9,440	12,385	13,278	11,861	18,576

<sup>1/</sup> Based on audited IFRS data.

**Table A9.32: EVN - Key Performance Indicators**(VND billion - nominal prices)<sup>1/</sup>

	2005	2006	2007	2008	2009
<b>A. Profitability</b>					
	14.1	15.8	17.3	14.3	15.8
Gross Margin	percent	percent	percent	percent	percent
Operating Margin as percent Net Sales	15.1	8.9	10.1	-6.1	3.0
	percent	percent	percent	percent	percent
	6.4	3.4	4.0	-10.4	-2.1
Return on Equity ( percent)	percent	percent	percent	percent	percent
	4.7	2.5	3.2	-7.9	-1.3
Return on Net Fixed Assets	percent	percent	percent	percent	percent
<b>B. Sales &amp; Tariffs</b>					
Energy Sales (GWh)	44,844	51,317	58,450	65,930	74,816
	13.0	14.4	13.9	12.8	13.5
Growth in Energy Sales ( percent)	percent	percent	percent	percent	percent
Average Tariff (VND/kWh)	794	798	862	872	972
<b>C. Liquidity &amp; Capital Structure</b>					
Quick Ratio	0.9	1.0	0.9	0.6	0.7
Current Ratio	1.5	1.7	1.6	1.2	1.1
Debt:Equity Ratio	53:47	56:44	53:47	64:36	68:32

## Annex 10: Safeguard Policy Issues

### VIETNAM: VN-Trung Son Hydropower Project

1. In addition to the requirements of Vietnamese environmental legislation, the Trung Son Hydropower Project (TSHPP) also complies with applicable environmental policy and standards of the World Bank Group. An Environmental Assessment (EA) was carried out following terms of reference (TOR) agreed with the World Bank. The TOR was discussed in public meetings. The project triggers eight World Bank safeguard policies: Environmental Assessment; Natural Habitats; Pest Management; Indigenous Peoples; Involuntary Resettlement; Physical Cultural Resources; Safety of Dams; and Projects on International Waterways. Compliance with these policies is summarized in Table A10.1.

**Table A10.1: Compliance With World Bank Safeguards Policies**

<b>Safeguard Policies</b>	<b>Actions</b>
Environmental Assessment (OP/BP 4.01)	<ul style="list-style-type: none"> <li>● Category A project. Full EIA and Environment Management Plan (EMP) have been prepared for the project</li> <li>● Full, stand alone EMP and Resettlement Plan were prepared for the access road, to be built ahead of the main works.</li> <li>● An Environmental and Social Panel of Experts has actively participated in project preparation.</li> </ul>
Natural Habitats (OP/BP 4.04)	<ul style="list-style-type: none"> <li>● The project does not have direct impacts on critical natural habitats</li> <li>● Adequate assessment of induced impacts stemming from additional pressures from camps on protected areas and mitigation measures incorporated in EMP</li> </ul>
Pest Management OP/BP 4.09	<ul style="list-style-type: none"> <li>● Mosquito control programs will be implemented in workers' camps and resettlement sites. In addition, the project will provide garden plots for resettled families.</li> <li>● Specifications for safe handling of pesticides and all hazardous wastes have been included in bidding documents for main contractors.</li> <li>● The Resettlement Plan and CLIP includes technical assistance to resettlement families on management of garden plots.</li> </ul>
Physical Cultural Resources (OP/BP 4.11)	<ul style="list-style-type: none"> <li>● Archeological survey conducted along on reservoir areas and all ancillary sites</li> <li>● Two paleontological sites were recommended to further study and excavation</li> <li>● Chance finding procedures during construction have been prepared and will be included in bidding documents and contracts.</li> </ul>
Involuntary Resettlement (OP/BP 4.12) Indigenous Peoples (OP/BP 4.10)	<ul style="list-style-type: none"> <li>● Social Assessment has been conducted</li> <li>● Since about 98 percent of people to be resettled belong to ethnic minorities, the requirements of the two safeguards policies have been met in a single Resettlement Livelihood and Ethnic Minorities Development Program (RLDP) which includes a Resettlement Plan (RP), a Community Livelihood Improvement Plan (CLIP), and an Ethnic Minorities Development Plan (EMDP).</li> </ul>
Safety of Dams OP 4.37	<ul style="list-style-type: none"> <li>● A Dam Safety Review Panel was created.</li> <li>● The Panel has reviewed all designs and emergency plans.</li> <li>● A dam safety report has been issued by the Panel confirming the design and plans meet international standards.</li> </ul>
Projects on International Waterways OP 7.50	<ul style="list-style-type: none"> <li>● Formal notification to Laos was carried out by the Government of Vietnam</li> <li>● A formal response from the Government of Laos, acknowledging and accepting the Trung Son Project was issued.</li> </ul>
Consultation	<ul style="list-style-type: none"> <li>● Intensive, culturally sensitive consultation efforts were carried out in all communities in the area of influence of the project on the EIA and RLDP. Governmental and Non-Governmental organizations were also consulted in public meetings.</li> </ul>

2. The Forest Policy (OP 4.36) was not triggered in this project. The natural forests in the TSHPP area have been significantly exploited for household and commercial purposes. Vegetation in the reservoir and dam construction site, and the access road consists mainly of

plantations of luong bamboo (*Dendrocalamus membranaceus*), other bamboo (*Melia azedarach*) and other planted trees with very low biodiversity value. Natural vegetation in the reservoir area has been severely exploited, converting the land into scrubland and grasslands with low biodiversity value.

3. The project area is defined as the commune that is immediately upstream of the reservoir, and all communes bordering either the reservoir above the dam or the Ma River below the dam as far as the confluence with the Luong River approximately 65km downstream. It also includes the communes through which the power lines and access road are proposed to run. At its full supply level, the reservoir will submerge 1,313 hectares (ha) of land, from which around 1,069 ha is planted forest land, including 1,000 ha of luong bamboo plantations and 69 ha of natural forest.

ENVIRONMENTAL ASSESSMENT (OP/BP 4.01), NATURAL HABITATS (OP 4.04) PEST MANAGEMENT (OP 4.09), AND PHYSICAL CULTURAL RESOURCES (OP 4.11)

#### Environmental Assessment Reports

4. The project is considered Category A for environmental purposes due to the scale of potential environmental and social impact and the sensitivity of the project areas. Environmental impact studies were first undertaken in 2003. This Environment Impact Assessment (EIA) was updated in 2007 as required by Vietnamese regulations. At the request of the Bank, additional studies were undertaken in 2008 in aspects such as water quality modeling, fish and fisheries, biodiversity, physical cultural resources, camp and construction management, and health. Social studies leading to the Resettlement, Livelihoods and Ethnic Minorities Development Program (RLDP), and additional consultations with affected communities were also undertaken.

5. Based on these additional studies and efforts, two environmental and social reports were prepared. The Supplementary Environmental and Social Impact Assessment Report (SESIA) and the RLDP, both dated January 2011, bring together, summarize and update the findings of all prior studies and identify mitigation and compensation plans and actions to address environmental and social impacts due to the project. SESIA also provides the linkages with the RLDP.

6. The SESIA includes comprehensive impact assessment and developed necessary mitigation measures to avoid, minimize, mitigate and compensate adverse impact identified. It is concluded that the adverse environmental and social impact will be minimized and otherwise mitigated provided that the mitigation measures are adequately implemented. Main issues addressed in the SESIA, including natural habitats, and physical cultural resources, are summarized below.

#### Environmental and Social Setting

7. The area of the project presents unique ecological and cultural characteristics which make this project particularly challenging: a shared watershed with Lao PDR, sensitive but threatened ecosystems, and a sensitive socio-economic setting.

8. A shared river basin. The Ma River rises in Dien Bien province in Northwestern Vietnam; it then flows through Lao territory and back into Vietnam in Thanh Hoa province, finally discharging into the East Sea. The Ma River has the fifth largest catchment area in Vietnam after the Mekong, Red and Thai Binh, Dong Nai and Ca Rivers. The total area of the

basin is 28,400 km<sup>2</sup> of which 62 percent (17,600 km<sup>2</sup>) is in Vietnam territory and 38 percent (10,800 km<sup>2</sup>) in Laos. The main stem of Ma River has a length of 512 km with 410 km in Vietnam.

#### Sensitive but Threatened Ecosystems

9. The project will be located in the middle section of the Ma River. The area houses important, albeit degraded, terrestrial and aquatic ecosystems.

10. Terrestrial Ecology. The project will be located between three provincial level nature reserves: Pu Hu Natural Reserve (Thanh Hoa Province), Xuan Nha Natural Reserve (Son La Province) and Hang Kia – Pa Co Natural Reserve (Hoa Binh Province). These reserves are characterized by tropical and sub-tropical evergreen forests still with high biodiversity values: 936 species of vascular plants, 79 species of mammals, 258 species of birds and 30 species of amphibians. A total of 216 species are considered at risk; 41 species of plants and 33 species of animals are considered as internationally endangered; 93 species of plants and five species of animals identified in the natural reserves are endemic to Vietnam. This biodiversity is threatened significantly mainly by habitat destruction through economic development, but recently by the rapidly increasing wildlife trade, which is driven by a growing urban market for wildlife for consumption and for export, and exacerbated by weak management capacity in the management boards of the reserves. These threats will continue in spite of the presence of the project. However, the project could worsen these threats.

11. Aquatic Ecology. Vietnam has an extensive diversity of aquatic species. In the vicinity of the Trung Son project, 198 fish species of 141 genera, 57 families and 13 orders have been identified. This represents 19 percent of the total number of fish species in the country. Ninety-six percent of these species are native to Vietnam while the remaining four percent are classified as exotics. In total, there are 95 freshwater and 103 brackish water species. Nine of the 198 fish species are listed in the Vietnam Red Data Book but not in the 2006 IUCN Red List because they are all widely distributed in rivers of North and Northern- Central Vietnam. There is a conspicuous migration of brackish fish species into the upper catchments of the Ma River. Out of the 60 species which migrate upstream, only 44 reach the lower catchment, which is 30 km from the river's mouth, twelve species reach the middle catchment, and the remaining species migrate further than 100 km upstream to the upper catchment. The dam is approximately 200 km from the river mouth.

12. There are several economic fish species within the project area. Among these, only four species (*Cyprinus carpio*, *Hemiculter leucisculus*, *Cranoglanis sinensis* and *Mastacembelus armatus*) currently inhabit the entire area. Though the Ma River is rich in fish species, aquaculture productivity is low. Aquaculture is common in the middle and lower reaches of the Ma River but not in the project area. Aquatic resources from the Ma River are rapidly declining due to overexploitation and use of illegal destructive catching methods (explosives, poison), destruction of habitats especially of riparian forests, lack of enforcement of breeding seasons, restrictions on fishing tools and catch sizes, and river pollution and degradation by sand and gravel mining activities. It is expected that biodiversity levels of freshwater, estuarine and coastal marine fish species will continue to decline even in the absence of the project.



## Sensitive Socio-Economic Setting

13. TSHPP will be located in a remote area with extremely poor and culturally sensitive communities. The reservoir and main facilities are located in two provinces and three districts. Quan Hoa and Muong Lat Districts have small populations (respectively around 42,000 and 29,000 people), while Moc Chau has a larger population of 138,000 people. The project area is sparsely populated with population densities ranging from 36 inhabitants per square kilometer in Muong Lat, 42 in Quan Hoa, to 68 in Moc Chau. There are around 71 villages, 4,982 households and 25,723 people in the project area.

14. Rural poverty. Rural poverty is extremely high. Muong Lat District is recognized as one of the poorest districts in Vietnam. Infrastructure and services are underdeveloped and income sources other than agriculture and forestry are limited. Son La, Thanh Hoa and Hoa Binh provinces have the highest infant mortality rates in Northwest Vietnam (24-32 per thousand). Common health issues include tuberculosis (TB), malaria, HIV/AIDS, traffic accidents and mental disorder (schizophrenia and epilepsy). HIV/AIDS incidence in Son La Province, at 201 cases per 100,000 people, is 40 percent more than the national average. There is high under nutrition among children under five years of age and a low uptake of contraceptive methods for family planning.

15. Vulnerable Ethnic Minorities. The project is set in districts with a population that is almost fully (for Muong Lat District) or mostly (in other districts) from four ethnic minority groups: the Thai, from the Tay-Thai ethno-linguistic family, the Muong, from the Viet-Muong ethno-linguistic family, the H'Mong, from the H'mong-Dao ethno-linguistic family and the Kho Mu from the Mon-Khmer ethno-linguistic family. The distribution of the population within the project area among these three ethnic groups is: Thai (85 percent), Muong (13 percent), and H'Mong (2 percent). There are about 800 Kho Mu in the project area (less than 0.04 percent). The nationwide Kinh majority accounts for less than 1 percent percent of population in the direct area of influence of the project, with a higher percentage in downstream communes villages. High poverty incidence in the project area is correlated to the high proportion of ethnic minority people. Of these groups, the H'mong have significantly higher poverty levels than the other three groups. Traditional family structures have changed dramatically among Thai, Muong and H'Mong people as nuclear households, consisting of three to four generations, no longer exist. This has had a large impact on maintaining family connections. The practice of extended families has declined so that most houses now comprise a single household.

16. The Thai and the Muong display a relatively small cultural gap with the mainstream Vietnamese society. They generally live in mixed villages and have a good understanding of the Vietnamese language except for older people. They maintain strong traditions in terms of social organization, roles of traditional leaders, housing preferences, and their animist religion. The Kho Mu moved from living at high altitude to river valleys in about 1984, and settled among Thai villages in Ten Tan commune of Muong Lat District. They intermarry with Thai people and use Thai as a common language and appear to be well acculturated into Thai communities for most practical purposes.

17. The H'Mong retain a significant cultural gap both with the mainstream Vietnamese society and with the three other groups. They live in fully or mostly H'Mong villages and no intermarriages are reported. Most H'Mong women have very limited understanding of the Vietnamese language. H'Mong people maintain strong social networks within their own kin

groups. Cultural sensitivities, in tandem with widespread poverty, limited skills, remoteness from markets and other services and lower levels of integration combine to create significant challenges to successful resettlement and livelihoods development, as discussed below.

### Important Archaeological and Cultural Resources

18. Archaeological investigations were undertaken to identify and study potential areas containing relics and artifacts. Investigations found 11 sites, seven of which are within the new reservoir area. Twenty six Metal Age artifacts (five bronze, 20 stone and one bone-horn object) and several historical artifacts (one bronze bar and a collection of zinc coins) were also collected from several villages. Two sites of importance were identified which merit further research:

- *The Paleolithic site of Nang I village*: a unique Paleolithic site found in Mung Lát commune in the district of Quan Hoá. The finding of this site significantly clarifies the spatial distribution of the prehistoric resident groups in the Northwest area of Vietnam; and
- *The burial area of Huoi Pa* which plays a significant role in the study of history and ethnic races in the Western Thanh Hoa. The site is dated to the 16<sup>th</sup> – 17<sup>th</sup> century, lying within the cultural space and activities of Thái people but bearing a few elements of Mường burial areas.

19. The area also has some places of significance for the local populations: *Khieng San* and cemeteries. A *Khieng San* is a village's sacred place where rituals are performed. Cemeteries follow traditional stone markers but with smaller stones rather than the large stone markers in ancient tombs.

### Analysis of Alternatives

20. The general question of alternatives to TSHPP has four parts:

- (a) Could the need for additional peaking power be met by more aggressive energy conservation, demand side management and transmission and distribution (T&D) loss reduction? In other words, is there a need to expand supply at all?
- (b) Given that Vietnam does indeed need to add capacity, what is the optimum supply side expansion strategy, and does it include hydro? Put another way, is there a cost-effective alternative to the strategy of developing hydro as the best source of peaking power?<sup>30</sup> The reasonable alternatives are gas in some combination of open and combined cycle generators, possibly using imported liquefied natural gas (LNG); and pumped storage (in combination with either nuclear or coal).
- (c) Given that hydro is indeed the best option for peaking power, how does TSHPP compare with other hydro options? Are there more attractive hydro projects that should be built in its place (or built before Trung Son)? Would imports from Laos, Cambodia or China be more attractive (lower costs or lower environmental impacts)?

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<sup>30</sup> Environmental considerations may constrain operation of hydro as a pure peaking project because ramp-up times should not exceed increases in stream flow rates experienced under natural conditions, and because of the minimum downstream flow requirement.

- (d) Given that a hydro project in the Trung Son section of the Ma River is the best option, what specific site alternatives are available, and what are the general alternatives for project configuration (particularly with respect to high water elevations and environmental and social impacts of the project alternatives)?

21. Some further engineering design questions that do not have significant environmental and social impacts are not discussed here: these are covered in the detailed feasibility and engineering studies.

#### ***Alternatives to Supply Side Expansion***

22. The proposition that Trung Son might not be needed because alternatives to supply side expansion could meet the incremental demand cannot be sustained. Given Vietnam's need for economic development, the increasing demand for electricity in general, and peaking supply in particular, simply cannot be accommodated by demand side options alone. Moreover, unlike many South Asian countries, T&D losses are already quite low, and the present strategy already includes significant expenditures to bring this down from around 11 percent presently to 9 percent. With one or two exceptions, the efficiency of Vietnam's thermal projects is good, and the older ones (such as the Pha Lai 1 and Uong Bi coal projects) will either be rehabilitated or retired by 2015 – measures that again are already envisaged in the power development plan.

23. EVN has embarked on an ambitious DSM program (including a compact fluorescent lamp – CFL – promotion program, and a major initiative to improve commercial energy efficiency). The same is true of small renewable energy projects: several recent reforms such as the introduction of a standardized power purchase agreement, and a published avoided tariff, and the World Bank supported Renewable Energy Development Project (REDP, Cr. 4564) are expected to enable the ambitious 6<sup>th</sup> Power Development Plan target for around 1,500 MW of small hydro and other renewables by 2015. In short, while all of these alternatives to supply side expansion are unquestionably desirable, they are already under implementation, and simply do not represent an alternative to Trung Son: *both* are needed.

#### ***Hydro in the Optimum Capacity Expansion Strategy***

24. All power systems require peaking plant, and if hydro projects are not built, the likely alternative is natural gas based combined cycle projects. Not only does this imply additional greenhouse gas emissions, but it also incurs significantly higher costs, particularly were gas to be priced at international levels (which means a gas price equivalent to about 90 percent of the Singapore fuel oil price). Even when gas is priced using the formula for the Ca Mau plant, at 45 percent of the fuel oil price, developing Vietnam's remaining hydro projects brings significant economic benefits. At capital costs below \$2000/kW, hydro projects are win-win, bringing significant avoided GHG emission and economic benefits. In addition, reducing the dependence of imported fossil fuel by developing indigenous renewable energy resources improves energy security through greater supply diversity.

25. A study of the national hydropower development plan by the Stockholm Environmental Institute confirms these arguments. Based on a series of capacity expansion scenarios with progressively less hydro it finds the costs of not developing the hydro projects presently identified in Vietnam's 6<sup>th</sup> Power Development Plan as prohibitively expensive. This is true even when all indirect costs are quantified, such as the economic loss of forest products from the inundated area.

### ***Alternative Hydro Projects to Trung Son***

26. Trung Son is one of many potential hydro projects in the remaining inventory of candidates, which raises the question of whether there are better hydro projects, which might in turn lead to it being delayed in favor of other projects, including ones in Laos and Cambodia. This question is answered in two parts. First, when all of the uncommitted hydro projects are provided as candidates to a capacity expansion optimization, Trung Son is built first. Second, when one compares Trung Son against all of the other potential hydro projects on the basis of the main environmental attributes (loss of forest, persons displaced, power density, cost of energy), the high ranking of Trung Son is confirmed. In short, given that the overall strategy requires the development of Vietnam's remaining economic hydropower resource endowment, Trung Son is one of the most attractive projects within that strategy.

### ***Alternative Project Sites and Reservoir Configurations***

27. The Master Plan for the Development of the Ma river has considered a range of sites and development options. The subsequent evaluation of alternative Trung Son project configurations was based on a trade-off analysis between optimal hydro production on the one hand, and environmental and risk considerations on the other – including minimization of geotechnical risks, minimizing the number of project affected persons, and avoiding reservoir impacts in Laos (which constrained the full reservoir elevation to 164 meters above sea level).

### ***Conclusions***

28. The following conclusions may be drawn from this analysis of alternatives to TSHPP:

- (a) Vietnam's power sector development strategy of developing its indigenous conventional hydro resources, and its domestic gas and coal resources, before turning to other imported fuels, is robust to a wide range of uncertainty in input assumptions, including assumptions on load forecast and international energy prices.
- (b) Alternatives to this hydro strategy would be extremely costly, with significant increases in GHG emissions.
- (c) These general findings are also confirmed by the Strategic Environmental Assessment of the hydro development plan prepared for MoIT by the Stockholm Environmental Institute.
- (d) The power development plan already envisages a substantial program of small hydro and renewable energy development, as well as efforts to promote supply and demand side energy efficiency. Not building *any* additional peaking power generation projects is not a reasonable alternative, given Vietnam's likely progress in economic development and poverty alleviation.
- (e) Among the remaining hydro projects, Trung Son has favorable economics and relatively modest environmental impacts that are expected to be fully mitigated by the World Bank's safeguards policies.
- (f) The Trung Son investment decision is robust with respect to load forecast uncertainty and international oil price uncertainty.

### **Major Environmental and Social Impacts of Project Components**

29. The major environmental consequences of the project stem from the dam and the reservoir it will create. However, beyond the normally expected impacts from dams and

reservoirs, the construction of the dam itself poses perhaps the highest environmental and social risk.

30. Construction impacts. The construction of the dam and its ancillary infrastructure will entail potentially significant negative impacts on communities and surrounding terrestrial and aquatic habitats. The proper management of excavation materials, river and drainage crossings, and the reduction of nuisances such as dust, noise, increased traffic, pedestrian safety concerns, and the presence of a large work force in or near small rural communities, will require careful engineering planning, close supervision, and a continuous and intense community information program. Environmental and social specifications will be included in all bidding documents and contracts. During the construction period, construction and material carrier vehicles will use both new and existing village roads. The presence of communities and some schools along some of these roads poses a significant risk for pedestrian and student safety. Traffic management during construction will require strict controls.

31. Downstream impacts. Changes in the river flows downstream from the dam could have negative impacts on fish biodiversity, erosion and sedimentation patterns. The diminished flows downstream will create unsuitable conditions for fish in the immediate downstream segments of the Ma River and may impact fisheries and aquaculture. Increased erosion is expected to be significant downstream as a result of flow variations and the lower sedimentation loads of water released from the dam. There may be harm to historic or culturally significant artifacts and river transport will be impeded. No significant river infrastructure exists in the downstream area close to the dam and flood control benefits can be expected. Sedimentation and erosion phenomena are expected to stabilize beyond the confluence of the major Luong tributaries of Ma River about 65km downstream of the dam.

32. Water quality. Water quality in the reservoir can be harmed by the flooded vegetation and the formation of weak stratification in the reservoir. Reservoir quality modeling has demonstrated that the low density of flooded biomass (less than 24 ton/ha) and the low retention time of the reservoir (water renewal rate of 16 days) will ensure proper levels of water quality albeit there might be some deterioration in the earliest stages of flooding. The models have also shown a moderate tendency for thermal stratification.

33. Construction/upgrading of roads/transmission line. A 20.4 km access road will be built. In addition, access roads and tracks (some temporary) will be needed for construction. Potential impacts include resettlement, erosion, slope instability, dust, traffic safety risks, increased access to nature reserves. The construction of the power supply line and transmission line to evacuate power from the plant can also exert impacts, mainly land acquisition, along its alignment although experience suggests that these are not normally severe.

34. Terrestrial biodiversity and threatened species. Direct impacts on terrestrial biodiversity are expected to be insignificant. The area to be flooded, the construction and camp sites, borrow pit and other infrastructures will affect areas that have long been inhabited, grasslands, disturbed habitats, and degraded forests. There will be some encroachment by the reservoir into the nature reserves' buffer zones, as allowed under Vietnamese law but this will be into the most degraded areas. However, significant indirect impacts on terrestrial biodiversity are expected to occur as a result of increased population (workers and camp followers) and increased access to the area. The improved access road to the dam and the reservoir will make the nature reserves more easily accessible particularly for hunting thus increasing the vulnerability of endangered species. The

demand for fuel for cooking will increase illegal timbering and logging. The value of wildlife for communities has been traditionally high. However, in addition to food intake, current hunting takes place to meet demand from restaurants in the area especially in Mai Chau. Perhaps the most sensitive impact from the project, the influx of a large number of workers, will encourage current practices of poaching and illegal logging in the nature reserves. This may be worsened by the current weak management and protection capacity in the reserves.

35. Aquatic habitats, fish and fisheries. Aquatic habitats are also likely to be affected by project construction and operation. Erosion and sediment loads will be increased by construction activities and clearing of reservoir area. There is also a potential for wastewater pollution from camps and by oils and fuels and other chemicals used during construction. Once construction is completed, the long term impacts on aquatic habitats and fish biodiversity will occur. Impoundment of 38.5 km of the Ma River and the formation of the reservoir, plus changes in thermal characteristics of the reservoir, will displace many species not able to adapt to the new conditions. The reduced flows from the dam and the variation in water levels will reduce fish populations in the immediate downstream segments of the river. Fish migration in the Ma River is limited up to the lower and middle sections of the watershed up to 100 km from the river's mouth. Few species go all the way up to upper watershed. Therefore the dam is not expected to alter significantly migration patterns in the Ma River. Fish monitoring in similar watersheds in Vietnam has demonstrated the existence of healthy fish populations downstream and upstream of hydroelectric projects located in the middle segments of the river.

36. Historical sites. Two historically important sites will be flooded by the reservoir. Local cemeteries and *Khieng San* in three communities will also be flooded. There is a high probability of chance findings of items of cultural significance during construction.

37. Environmental Impacts of Resettlement. Each resettlement site will be provided with adequate infrastructure which will be designed and implemented during the resettlement process. The proposed infrastructure includes:

- Rural roads, ferry stages and bridges: approximately 43.2 km of Class B rural roads, five ferry stages and two small bridges.
- Water Supply: 14 water retaining walls which are about 1 m – 1.2 m high, 41.5 km of distribution pipes to convey water from source to households for domestic use, and 26.5 km of channels for irrigation serving 27 ha of rice field, two crops/year.
- Power supply: build 13 substations of 31.5 kVA, 75 kVA or 100 kVA. Install 10.7 km of 0.4 kV power line and 30.18 km of 35 kV power lines.
- Commune buildings including 8 kindergartens, 5 classrooms and 4 accommodations for teachers, 5 cultural houses. All are grade 4 (one storey).
- Housing: Affected households may have the choice of building their new houses on their own, or having the project to build houses for them based on the model that affected households has chosen among those introduced by the project.

38. Although minor, these infrastructure projects could exert localized impacts near the protected areas and will require careful siting, design and construction.

39. Pest Management Issues. Mosquito control programs will be implemented in all workers camps and resettlement sites. Resettled families will be provided with garden plots for planting fruits and vegetables. The management of pesticides and other hazardous wastes is included in the environmental specifications for contractors. Mosquito control in resettlement sites will

follow government procedures. The CLIP includes training for resettlers on management of the pesticides including Integrated Pest Management

40. Cumulative Impacts. The immediate cumulative impacts from project activities will be the increased pressure on harvesting of wildlife for food and other consumptive use in protected areas. Hydroelectric development in the Ma river watershed will be intensive in the next decades. At least four other hydroelectric projects are planned for the basin, with one (Cua Dat on the Chu branch) already under construction. This development will have significant impacts on water quantity (flows), water quality, fisheries, and sediment transport. A set of issues at the river basin level have been identified in the EIA of the TSHPP and other strategic reports carried out in Vietnam during the last few years. Potential key direct and indirect impacts caused by the proposed project and medium and long term development in the region: hydrology; vulnerability to flooding; fisheries; water quality; navigation; water supply and irrigation; and aquatic biodiversity. Of special concern are the cumulative impacts on aquatic biodiversity. In addition, the EMP also includes the budget and terms of reference for a comprehensive cumulative impacts assessment at the regional level from development programs in all sectors.

#### Environmental Management Plan For Reservoir Area

41. A stand-alone EMP for the reservoir area has been developed based on the findings of the EIA and SESIA. The EMP details the environmental management and supervision organizations and responsibilities, mitigation measures, capacity training plan, monitoring plan, and budget estimates for implementation. Relevant elements of the EMP will be incorporated into bidding documents and contracts to ensure effective implementation throughout the preconstruction, construction and operation phases of the TSHPP.

42. EMP implementation will be managed by Trung Son Hydropower Company (TSHPCo). An environmental management unit has been established in TSHPCo with dedicated environmental staff. Qualified environmental staff will be required to be assigned in contractor and environmental supervision engineer teams to ensure effective implementation of EMP. The main elements of the EMP are discussed below.

43. Construction Impacts Management Plan. Measures to minimize negative impacts of construction activities on local communities and the natural environment, to reduce the induced impacts of camp followers, and prevent pollution. Appropriate management of construction activities include sediment and erosion control, quarry and disposal sites management, traffic management, nuisances (dust, noise) reduction measures, management and prevention of oils and fuels and spills, wastewater and solid waste management plans, and decommissioning and restoration of all affected areas. Environmental supervision of all construction activities will be part of the compliance framework. All contractors' activities during construction, including the setting up and management of the workers' camp will be tightly managed and regulated through the Construction Workers' Camp Plan. The workers' camp will be required to provide alternate fuel sources for cooking to minimize the local demand for firewood. Canteens and restaurants under the control of contractors will be prohibited to serve wild meat. Strict worker behavior rules regarding poaching, hunting, and illegal logging will be enforced. Additional control of entrance and exits in camps and construction areas and access roads to minimize poaching and environmental education awareness campaigns to workers and local communities will be implemented. A Health Management Plan has been designed to address health issues at the

workers camps. Thorough demining for each site within the project area will be required before the initiation of any construction works.

44. Biodiversity and Protected Areas Management Plan. The Biodiversity Plan puts in place measures to ensure protection of local and regional biodiversity and minimize project impacts on three adjacent protected areas. The plan will support the three Reserves' Management Boards to strengthen their patrolling and control measures and implement reserve management plans. Support to community fisheries and aquaculture programs will be provided as part of the livelihood restoration activities. A minimum environmental flow of 15m<sup>3</sup>/s will be maintained at all times downstream of the reservoir. It is expected that hydrological conditions will stabilize once the discharge from major tributaries come into the Ma River downstream of the dam. This will guarantee a minimum of aquatic conditions for fish during the dry season. Monitoring programs for embankment erosion will be implemented downstream. Based on the results of this monitoring additional appropriate measures will be implemented (see adaptive management approach below).

45. Vegetation Clearing and Salvage Plan. The plan includes measures to minimize biomass loss as a result of reservoir clearing and to coordinate timing to allow salvage benefits to local communities. Intensive water quality programs in the reservoir and downstream of the dam will be implemented.

46. Environmental Monitoring Plan. To ensure project compliance, and the success of proposed mitigation activities under this plan will continue baseline monitoring and review environmental and social performance. It will include water quality, fish, health, and pollution indicators.

47. Community Relations and Safety Plan. To inform local communities on progress of the project and ensure community safety, this plan will include feedback, complaint and grievance and conflict resolution mechanisms for non-resettlement and/or land acquisition matters. The main contractor will be required to work closely with the community relations and information program. More details on continued communication and participation in the project are given in Annex 11.

48. Public Health Action Plan. This plan puts in place measures to manage health risks in local communities, the workforce and camp followers. TSHPCo will implement a regional health plan to mitigate project impacts on the health of local populations, including resettlers at the resettlement sites, and health issues at the regional level. Environmental and social awareness programs for workers will be implemented and procedures to ensure hazardous materials such as pesticides and medical waste are properly handled.

49. Physical Cultural Resources Management Plan. To prevent any inadvertent loss of physical and cultural resources during construction and operation, procedures and measures for their mitigation and management of physical cultural resources have been prepared. Two sites have been proposed for further study and excavation before impoundment. Chance find procedures during construction have been prepared and will be included in all bidding documents and contracts. Special procedures, according to traditions and existing laws will be followed for all *Khieng San* and cemeteries.

50. Management of Infrastructure Projects in Resettlement Sites. In order to address the minor environmental impacts of all infrastructure projects to be built in resettlement sites, an



Environmental Management Framework has been designed and is included as an appendix to this EMP. The framework includes the actions, responsibilities and measures to guarantee that the impacts from all infrastructures built in resettlement sites are minimized. The Framework provides screening criteria, potential impacts and typical mitigation measures, and reporting and monitoring requirements for all project types to be built.

#### Environment Management For Access Road and Power Lines

51. A standalone EMP for the access road to the dam site has been prepared. Environmental specifications for contractors include measures for erosion control dust and traffic control, slope stabilization, road signage and enforcement of maximum speeds. Environment Guidelines (EGs) for power lines have been prepared and adopted by TSHPCo and NPT. The EGs will be used to prepare the EMP for the power lines that will be built by TSHPCo to supply the construction site. They will be used by NPT to prepare the EMP for the transmission line that will be used to evacuate the power from the completed TSHPP. As with all roads and transmission lines, potential direct impacts are considered manageable with good engineering practices in the final siting of the towers and application of environmental codes of practice during construction.

#### Additional Studies

52. Additional studies are planned to improve information for the project and improve future decision making. One means of mitigating the effects of hydropower development in the Ma River is to ensure that selected branches of the river system remain unaltered and unaffected. This would need to consist of a complete unaltered sub-basin with no dams or barriers and a high level of protection from other impacts such as mining-related pollution, forestry, wastewater pollution from urban areas, and destructive fishing practices. Having a completely unaltered system would preserve the ecological connectivity within one branch of the system and provide species with inter-habitat migration from one part of the basin to another.

53. Fish biodiversity studies carried out for Trung Son recommended that two complete river sub-basins of the Ma River should be kept free from barriers and activities that impact fish biodiversity. Keeping these two sub-basins “intact” will ensure that a full sequence of fish habitats and migratory routes is protected in the Ma River. Potential candidate sub-basins are: for such an intact rivers scheme are the Buoi River and the Luong River. The EMP includes provisions, budget and terms of reference for a study to evaluate the feasibility of keeping any sub basins intact.

54. In addition, the EMP also includes the budget and terms of reference for a comprehensive cumulative impacts assessment at the regional level from development programs in all development sectors. Other studies include additional water quality and sediment transport studies.

#### INVOLUNTARY RESETTLEMENT (OP4.12) AND INDIGENOUS PEOPLES (OP4.10)

55. Social impacts will be driven by two factors: (a) the need to acquire land and relocate people for the reservoir, the dam sites, borrow pits, access and construction roads, transmission lines, and disposal sites; and (b) the presence of a large workforce in an area with vulnerable ethnic populations.

## Resettlement Impacts

56. Approximately 2,327 households, or 10,591 people are affected by the project – this figure includes a preliminary estimate of 325 households or 1,625 people affected by the transmission line, who are expected to be affected by minor land losses. Of these 2,327 households, 1,516 will be affected by main project. An estimated 699 are impacted on residential land, houses, infrastructure and agricultural land to the extent that they will have to be relocated. Others will lose varying proportions of their productive land in the project affected area, but their houses are not affected. There are 40 who have neither residential land nor house in the flooded area but are eligible because their land and house are isolated by the formation of the reservoir. The 357 households affected by the planned resettlement sites in host communities are only losing agricultural land for this purpose. Table A10.2 presents a summary of the resettlement impacts from the TSHPP.

**Table A10.2: Number of People Impacted By Project**

	<i>Households</i>	<i>People</i>
<b>Reservoir flooded areas</b>	<b>1059</b>	<b>5,038</b>
(a) Relocated	533	2,445
(b) Agricultural land lost (but not relocated)	519	2,570
(c) Productive assets other than land impacted (e.g. shops) but not relocated	7	23
<b>Within the construction area</b> (borrow pits, roads, construction site and construction camp)	<b>100</b>	<b>439</b>
<b>Households losing land to incoming resettlers</b>	<b>357</b>	<b>1,535</b>
<b>Affected by access road<sup>1</sup></b>	<b>486</b>	<b>1,954</b>
(a) Relocated	66	274
(b) Agricultural land lost (but not relocated)	420	1,680
(c) Productive assets other than land impacted (e.g. shops) but not relocated	20	75
<b>Affected by transmission line (estimates)<sup>2</sup></b>	<b>325</b>	<b>1,625</b>
<b>Total</b>	<b>2,327</b>	<b>10,591</b>

<sup>1</sup> Total is not the arithmetic sum of the three figures below because all households are affected in more than one category.

<sup>2</sup> Estimate based on experience of other transmission lines in Vietnam.

57. The full effects of the transmission line cannot be assessed until its detailed design, including alignment has been completed; this is not due to take place until late 2012 because of the shorter construction time required for it. This estimate is based on experience of about five households per kilometer being affected in other projects in areas with similar population density elsewhere in Vietnam. Few if any households are expected to have to be relocated or be severely affected (losing more than ten percent of their total land holding).

## Land Impacts

58. The project affects three types of land: (a) land used for crop production (paddy fields, upland fields on slopes); (b) residential land; and (c) forest land; and two types of assets other than land: (d) houses and (e) shops. No project-affected land currently under community land use right certificates previously allocated to a church, pagoda, temple or ethnic minority community center has been identified during the inventory of losses. Around 76 percent of the

land flooded by the reservoir presents steep slopes (equal or greater than 30°) and under bamboo cultivation. Among income sources, luong bamboo is the most significantly affected because it is mostly planted along river banks. At the reservoir supporting sites such as the dam, borrow pits, disposal sites, all land affected (198 ha) is forestry land with luong bamboo cultivation.

### Threats to Vulnerable Groups

59. The presence of a large workforce in close contact with vulnerable ethnic minorities poses a significant threat to their cultural values and community structures. A maximum workforce of 4,000 workers is expected during the construction period. Based on experiences elsewhere in Vietnam, camp followers may reach 400-1,000 people. Potential impacts arising from the workforce and spontaneous development include pressure on land and natural resources (logging, hunting), generation of solid and liquid wastes and increased public health risks. The spread of addiction and sexually transmitted diseases (STDs) such as HIV/AIDS is likely to occur if mitigation measures are not implemented. The interaction of the workforce with the local population will pose a threat to their family structure and traditional custom if mitigation measures are not implemented.

60. It is expected that the most vulnerable households in the project area will be: female headed households with dependents; illiterate individuals and households headed by illiterate people; households with disabled household heads; households falling under the current Ministry of Labor, Invalids and Social Affairs (MOLISA) benchmark poverty line; children and elderly households who are landless and with no other means of support; landless households other than households with stable non-farm incomes, and less-integrated ethnic minorities.

61. A comprehensive strategy to address work force and camp followers issues has been designed for the project. In addition to the provisions included in the RP and CLIP, other actions have been included in the EMP such as:

- (a) The construction workers' camps include codes of behavior and restrictions for their satisfactory management.
- (b) The *Community Relations and Safety Plan* that will inform local communities on progress of the project and ensure community safety; this plan will include feedback, complaint and grievance and conflict resolution mechanisms for non-resettlement and/or land acquisition matters.
- (c) The *Public Health Action Plan*. This plan puts in place measures to manage health risks in local communities, workforce and camp followers.
- (d) The EMP outlines the criteria for addressing camp followers issues by TSHPMB and the commitment to implement additional actions if warranted.

### Resettlement Policy Framework

62. Because of some incompatibilities between the requirements of Vietnamese law and regulations and the requirements of OP 4.12, a Policy Framework for Compensation, Resettlement and Rehabilitation of Project Affected Persons (RPF) has been prepared and approved by the Prime Minister. It establishes the principles, objectives, and definitions to be used in resettlement planning and implementation. It defines affected persons and establishes eligibility criteria for compensation or other forms of assistance, describes the legal and

institutional framework, establishes modes of asset valuation and compensation payment, arrangements for consultation and participation, and procedures for pursuing grievances.

63. The RPF applies to all aspects of the TSHPP, including impacts associated with dam construction area, reservoir impoundment, area for resettlement activities and upstream or downstream impacts associated with loss of access to land or other resources, but not to the access road or transmission lines.

#### Resettlement Plan for Access Road

64. Because the access road must be completed before the main construction work of the dam can begin, a RP for the road has been prepared and largely implemented. Some 486 households in Mai Chau District of Hoa Binh Province and Quan Hoa District of Thanh Hoa Province are affected by the road, of which 66 are being relocated. The RP makes provision for full compensation and relocation of all affected residents by offering (a) land for land or cash for land at replacement value and the option for relocation of all households who lose more than 25 percent of their land holding; (b) compensation for affected structures and other assets on land; (c) allowances to cover the cost of moving, re-establishing livelihoods and new houses and other costs. Special provision is made for severely affected households, which will receive additional allowances. All of those who must relocate their houses can do so within their own land holdings and there are consequently no new resettlement sites. Compensation for assets at replacement cost has been provided, in accordance with both local Vietnamese requirements and Bank policy.

65. Under the RP prepared for the access road, the definition of severely affected households only extended to those households having to relocate their houses or losing more than 25 percent of their productive land. There are 41 households which will lose more than ten percent of their productive assets but less than 25 percent; these households are considered severely affected as defined by OP4.12. Since the RP is now largely complete, TSHPMB has undertaken to ensure that they receive the same compensation as others considered severely affected and a covenant in the Project Agreement has been introduced for that purpose.

66. An independent monitoring consultant has made two visits to the road during the implementation of the RAP, once at the start of compensation in August 2009, and a second time in July 2010 when compensation was approaching completion. At time of writing only one household has yet to agree its compensation. The experience from this initial exercise, as well as feedback from consultations have been used to design the resettlement plan for the other parts of the project, taking into account in particular the following lessons:

- Households prefer to receive their full compensation in a single payment rather than two or three. This provides a sufficient capital sum to allow investment in new assets or livelihood activities. The practice of providing payment over a period of time was thought to avoid dissipation of the compensation on non-productive uses.
- Compensation for Luong bamboo must be designed to recognize its unusual nature as a perennial crop but also a store of value. In consequence a revised compensation schedule has been prepared which provides allowances to cover the time needed to establish a new luong plantation, and in the event that land for land compensation is not possible, a cash equivalent to its complete loss.
- An efficient community relations and grievance/complaints mechanism, including opportunities for involvement by independent parties is effective.

- Continued monitoring during construction will be needed in case additional resettlement is required. Mechanisms must be in place to allow compensation for assets not previously identified at the census or detailed measurement survey stages but which are nonetheless eligible.

67. The ethnic minorities living along the road alignment are mainly Thai and Muong and the social assessment found that these groups were fully integrated into the communities and economic life. An ethnic minorities development plan has been prepared as part of the RP.

#### Resettlement, Livelihood and Ethnic Minorities Development Program

68. The RLDP identifies the principles, measures and procedures to improve or at least restore livelihoods of local residents and to minimize or mitigate other negative social impacts on vulnerable ethnic minorities in the area affected by the dam and reservoir. The RLDP starts during planning, continues during construction and operation. The RLDP has been designed to ensure that all affected people have their livelihood improved or at least restored. The RLDP defines a core area for resettlement and livelihood development. These are the seven communes which will experience resettlement impacts as a result of the reservoir and the construction area and are expected to be the main beneficiaries of the three inter-related plans that constitutes the RLDP.

69. The three plans that make up the RLDP: Resettlement Plan (RP), Community Livelihoods Improvement Plan (CLIP) and Ethnic Minorities Development Plan (EMDP) form a single program because a significant proportion of project affected households are eligible for all three plans, and because implementation will be carried out in a largely integrated manner. Because almost all of the people residing in the project area are from ethnic minorities, the RLDP applies in its totality to ethnic minorities and has been designed in every part to address their vulnerabilities.

#### ***The Resettlement Plan***

70. The RP relates to losses of houses, land and other livelihood assets. The plan makes provisions for full compensation and relocation of all affected residents. Eleven resettlement sites are planned for four communes: four villages in Trung Son Commune; three in Tan Xuan; and two each in Trung Ly and Muong Ly Communes. Resettlement sites were first identified in 2004 but modified in 2008 following feedback received through local consultation. All planned resettlement sites are within the affected communes so that relocated households will be able to continue to manage their remaining land and other properties outside the project affected areas, and maintain social relationships.

71. Average distance from affected sites to resettlement sites is 2 km (actual distance by village). There will be a decrease in unused land (as officially designated) to allow the creation of residential land and new paddy fields. A detailed assessment of water resources was completed as part of the resettlement master plan. The planned relocation sites can provide water for household consumption through gravity systems to a total of 540 households. Households requiring resettlement were provided with three options: (a) relocation to resettlement sites as planned; (b) relocation to a site within the project area instead of resettlement sites as planned; and (c) Relocation out of the district/province area with additional assistance. Most households have stated a preference to continue to live from the land, and have therefore opted to relocate either to resettlement sites, or sites within the project area, including “up and back” within their own current village of residence.

### ***Community Livelihoods Improvement Plan***

72. The CLIP is a development plan for all villages affected by resettlement under the main project. Details are available for each participating village. Provisions for livelihood restoration will include: (i) enhancement and improvement of existing farming systems for most households. The majority of households have a preference for land-based livelihoods. The plan will provide options for households to adjust their farming systems to land and water resources in their new locations; and (ii) diversification into non-agricultural occupations through vocational training for some young people, and support to local microenterprises that will create local jobs. The plan also pays attention to retain human resources, i.e. to avoid that the majority of relocated households with higher formal education levels move out of the area. It provides to these households opportunities to stay in the project area.

73. Preliminary CLIPs have been prepared for all villages entitled to one. To test whether the CLIPs are realistic and implementable, and will have the desired outcome of restoring livelihood to at least pre-project levels, pilots are planned immediately following the loan approval. Training needs assessments will also be carried out based on the requested vocational training for younger people affected by the project.

### ***Ethnic Minorities Development Plan***

74. The EMDP builds upon a social assessment process and free, prior and informed consultations with potentially affected ethnic minority communities. The scope of the EMDP addresses impacts on ethnic minority communities not covered by other plans within the RLDP, providing supplemental forms of assistance to facilitate livelihoods development and social adaptation to changed surroundings. This includes an emergency grants program for households in vulnerable communities, grants for women's groups, and support for ceremonies associated with relocation of villages and graves. The EMDP, along with other measures incorporated into other aspects of the RLDP, are expected to ensure that the development process fosters full respect for the dignity, human rights and cultural uniqueness of ethnic minorities in the project affected area, and takes into account their development needs and aspirations.

### ***Management and Communication***

75. This activity provides a framework for management, formal and informal grievance mechanisms and the monitoring and evaluation system.

#### **People Affected by the Power Lines**

76. A separate RPF and Ethnic Minorities Planning Framework (EMPF) has been prepared for the power lines that will supply power during the construction phase and evacuate power during the operation phase of TSHPP. The RPF has been approved by the Prime Minister and will guide the preparation of the RP for the power lines and the transmission lines. The EMPF will guide the preparation of the EMDP for the power lines, if they are needed.

77. The power lines RPF defines as severely affected those households which have to relocate their houses or which lose more than 25 percent of their productive assets. The threshold for definition of severely affected in OP 4.12 is taken as loss of ten percent of productive assets. Rather than revise the RPF, which would require the approval of the Prime Minister, TSHPMB has undertaken to define in the RP as severely affected those households which lose more than ten percent of their productive assets. This will be a covenant in the Project Agreement.

## IMPLEMENTATION OF RESERVOIR EMP AND RLDP

78. TSHPCo, is responsible for the implementation of the EMP and RLDP in coordination with provincial and local institutions. Its duties include the following:

- (a) Implementation of additional studies on environment (intact rivers, cumulative impacts and water quality).
- (b) Implementation of the RP, CLIP and EMDP, including the inventory of losses, preparation of compensation and allowance plans, contracts for construction of the resettlement sites and associated infrastructure, delivery of compensation and allowances, in particular by preparing detailed schedules and plans, and monitors progress.
- (c) Management of the community relations program and the related business of the Independent Grievance Panel (IGP).
- (d) Implementation of communication activities jointly with the dedicated communications staff in TSHPCo.
- (e) Supervision of the environment and social aspects of the work carried out by the construction supervision consultants.
- (f) Contracting and supervision of IMCs for social and environment monitoring of all construction activities.

79. To undertake these activities, the Social and Environmental Division of TSHPCo has a current staff of 11 (eight working on social issues and three on environment). Six new staff will be hired, three to work on the CLIP and three on environment. Several staff, particularly those who are responsible for resettlement compensation activities, have moved to Mai Chau town, about 35km from the dam site, to facilitate resettlement activities. The head of the Social and Environment Division reports directly to the Director of TSHPCo. Additional expertise on gender, ethnic minorities poverty reduction and monitoring and evaluation will be hired either as staff or on long term consultant contracts. Where necessary local expertise will be supplemented by specialists with international experience.

80. Consultants and contractors, hired by TSHPCo will: support the preparation and implementation of the individual plans within the RLDP; carry out construction of resettlement sites and associated infrastructure; and conduct independent monitoring of each of the plans within the RLDP.

81. All EMP and RLDP activities have been adequately budgeted. EMP implementation is included in the contractual commitments of the civil works contractors, and these are estimated to be about 8 percent of the main civil works contracts. Hence EMP costs from this source are about \$11 million, with a further \$2.3 million budgeted for other support and monitoring activities. The RLDP costs are estimated at \$40.5 million, which amount includes cost of land acquisition, compensation payments, livelihoods restoration and support for ethnic minorities.

## SAFETY OF DAMS (OP4.37)

82. The Trung Son hydropower project is the first to be constructed on the Ma River although plans exist for development along the length of the main stem, including in Dien Bien province upstream of the Lao section of the river, and downstream of Trung Son. The Ma River

itself has a reputation for rapid flooding and frequent rises and drops in its flow rate. The climate in the area consists of a wet season, which runs from about May to September, and a dry season which runs from October to March.

83. The catchment area for the dam is about 14,660 km<sup>2</sup>, in a generally mountainous area of South East Asia which is subject to frequent typhoons. Typical typhoons can produce 400 or 500mm of rain over a period of 1-2 days. In the area of the dam site, the river is quite steep sloping, with an average gradient of 1.5 percent. The surrounding land has an average gradient of about 17.6 percent.

#### Dam Safety Requirements

84. Vietnamese dam safety requirements have been reviewed and compared with the requirements of OP 4.37. The most significant divergence in design practices is that Vietnamese requirements are based on a 'standards' approach. Dams are classified according to their type and height and only implicitly according to their potential adverse social, economic, and environmental consequences in the event of a dam failure. Analysis of risks is more associated with damages to the dam structure itself and less on the broader impacts on society. Trung Son is classified as a 'Class II' dam, because it is less than 100 meters high. It is therefore required to be designed to cope with a design flood frequency of 0.5 percent (that is the worst flood expected to occur in 200 years, which in Trung Son's case is estimated at 10,400 m<sup>3</sup>/sec), and a check flood frequency of 0.1 percent (13,400 m<sup>3</sup>/sec) without being overtopped. No consideration need be given to a worse flood, or the consequences of overtopping or dam failure should such a flood occur.

85. Other requirements have been found to be in general consistent with OP 4.37. The Vietnamese definition of large dam is more stringent than that of World Bank's OP 4.37. Vietnamese regulations differ from World Bank's OP 4.37 in that: (a) it does not require dam safety reviews by independent panels of experts throughout the whole project cycle from design, construction, filling of the reservoir to the start of operation; (b) although there are stipulations regarding operation and maintenance (O&M) and emergency preparedness requirements, it does not specifically require preparation of a detailed O&M plan and an emergency preparedness plan at the design stage and before reservoir impounding; and (c) current Vietnamese regulation does not require that, where failure of an upstream existing dam or a dam under construction could cause extensive damage to the new downstream structure, assessment of dam safety or recommendations of improvements needed in the upstream dam should be provided for review.

86. During preparation, TSHPMB commissioned studies to evaluate the probable maximum flood (PMF) at the dam site using two internationally-recognized methods to estimate the probable maximum precipitation (PMP): a statistical method using Hershfield equations and storm maximization and transposition. These studies indicated that the 72-hour PMF could be expected to be about 31,100 m<sup>3</sup>/sec. The studies were verified by an independent third party and found acceptable. The International Commission on Large Dams (ICOLD) considers it acceptable practice for the crest structure, waterway, and energy dissipation to be on the verge of failure, but to exhibit marginally safe performance characteristics for this flood condition. Given the duration (about 50 hours) and head (about 5m) of overtopping and the original dam design, such performance could not have been guaranteed and could have led to dam failure through scouring and undercutting of the dam foundations.



87. A number of options to improve the design of the dam were prepared and reviewed for feasibility to cope with the PMF from both technical and economic perspectives. An emergency fuse gate and spillway on the left bank of the dam was chosen as the most cost effective approach, which would avoid overtopping of the dam even under PMF conditions.

#### Dam Safety Review Panel

88. TSHPMB has established a Dam Safety Review Panel (DSRP) which has undertaken two missions at the feasibility stage and detailed design stage of the project. It has reviewed the quality assurance, O&M, instrumentation and emergency preparedness plans prepared by TSHPMB and found them satisfactory. The DSRP has reviewed the proposed revised design incorporating a fuse gate dam and emergency spillway. It has accepted the design proposal and EVN is now completing the detailed design of the new structure. All the other recommendations of the DSRP have been met and the DSRP has issued a letter providing its clearance of the plans. In consequence TSHPP now meets the requirements of OP 4.37 and international practice with respect to dam safety.

#### PROJECTS ON INTERNATIONAL WATERWAYS (OP7.50)

89. EVN briefed the Lao PDR Ministry of Energy and Mines on the TSHPP in late 2008, providing a summary of the project design features, an assessment of the social and environment impacts and noted that it had requested World Bank financing. It was agreed that EVN would provide annual updates on the project. Lao PDR provided its written no objection to the project on January 29, 2009.

90. During project implementation, it is expected that dialogue between MoIT, EVN and Lao PDR on river basin management will continue. Both cumulative impacts studies and river basin management studies proposed to be undertaken as part of the environmental mitigation component will support this dialogue.

#### MONITORING AND EVALUATION OF SAFEGUARDS IMPACTS

91. The EMP and RLDP include monitoring and evaluation activities which are adequately planned and budgeted.

92. Implementation of the EMP by contractors is monitored by the construction supervision consultant and independently monitored by the IMC, which also monitors the performance of the construction supervision consultant. Progress in implementing the EMP will be monitored at least annually and following major incidents. In addition a review will be undertaken at the request of project stakeholders. EMP completion and success in reducing impacts as expected are intermediate indicators and satisfactory compliance with the EMP is an outcome indicator for the project development objective.

93. The RLDP has a specific results framework, with the outcome of improvement or at least restoration of pre-project livelihoods and maintenance of cultural identity reflected in the project outcome indicators and thence is linked to the project objective. Internal monitoring of livelihoods by TSHPCo will be continuous, with summaries being prepared every six months and based on the household database developed to support resettlement. It will be mainly focused on process but the Safeguards Team will be responsible for maintaining data to allow impact monitoring to take place. Community monitoring will be on a continuous basis, by village monitoring groups. Risks to ethnic minorities will also be monitored once per year, using participatory assessment methods.

94. External monitoring of the RLDP will take place six-monthly using sampling of villages in the project area (including downstream villages). A mid-term impact evaluation will conduct a quantitative household survey to assess current livelihoods and predict livelihoods and incomes at expected project completion. A control group will be used for comparison purposes.

95. The monitoring of dam safety is the explicit responsibility of the DSRP.

#### EXPERT PANELS AND ADAPTIVE MANAGEMENT

96. In addition to using feedback from monitoring particularly with respect to the RLDP, other mechanisms for learning by doing are included in the project design.

##### Expert Panels

97. An Environmental and Social Panel of Experts (PoE) was established at the start of project preparation to provide independent review and guidance on the treatment of environmental and social issues associated with the Trung Son project. Among other duties, the PoE provides reports to TSHPMB and the Bank on the status and compliance with EMP and RLDP requirements. The PoE has already produced two reports on the preparation of the environmental and social documentation for the project. The recommendations from the panel have been incorporated in all of these documents.

98. The PoE is expected to have a continuing role during project implementation. Members of the PoE will participate in the Independent Grievance Panel (IGP, see Annex 11) and continue to monitor project performance. It is expected to have a role in guiding the additional studies that are proposed to be carried out, as discussed above, and will be supplemented by an international expert on livelihoods restoration. An important role of the PoE during project implementation will be to ensure that lessons learned are adopted.

99. The DSRP, in addition to its role in relation to OP 4.37 has provided technical advice during preparation of a broader nature, including providing information on sediment transport, water quality and procurement. In consequence the role of the DSRP will be absorbed by a Project Technical Advisory Panel (PTAP) which will, in addition to meeting the requirements of OP 4.37, be tasked to provide more general project technical and engineering advice. It is planned to continue to function until at least two years after first impoundment of the reservoir.

##### Adaptive Management

100. TSHPCo recognizes that the proposed plans may need future adjustments. An adaptive management approach will therefore be adopted for environmental and social management components. Safeguards will be proactively managed to reach fully the objective of meeting the requirements for management of: fish and fisheries in the reservoir and downstream; water releases and environmental flows; increased erosion downstream; water quality in the reservoir and downstream; health impacts; and resettlement and livelihood development. Adaptive management is expected to be important in at least four areas:

- Response to updates in the legal framework.
- Actual circumstances on the ground. If monitoring of any part of the environment or social management indicates that circumstances have been changed, or there have been oversights in preparation (for example if a household not included in the census is eligible for compensation) the application of the principles set out in the SESIA, EMP and RLDP will apply.

- **Budget.** The Environment and Social Mitigation component budget of the project is a cost estimate which will be adjusted as needed during implementation. Contingencies have been included to allow budget increases.
- **Schedule.** The schedule reflects the sequence of planned operations as of December 2010. It will be revised as frequently as needed during implementation. The mitigation plans are programmed for a five-year period from end-2010 until end-2016. The programs will close at the end of 2016 if and only if the objective had been reached.

101. Adaptation will only take place if the outcome of this adaptation is conducive to better achievement of the project objectives and principles. Adaptive management cannot be used to justify actions that would conflict with legal principles or Bank policies. Prohibited changes would include, among others:

- Altering or reducing environment standards that result in not restoring the project area to its pre-project condition to the greatest extent possible, or failing to mitigate known environment impacts.
- Ignoring or avoiding dealing with emerging environment or social issues.
- Restriction or elimination of entitlements and eligibility criteria, or reduction of compensation rates.
- Lowering the resettlement objective to below the requirement to at least restore incomes or living standards to below pre-project levels (or accepting a substandard outcome as satisfactory).
- Imposing activities on ethnic minority communities without free, prior and informed consultation resulting in expression of broad community support.

102. The POM will establish decision-making guidelines for adaptive management, distinguishing between actions that may be taken by TSHPCo or local implementing agencies on their own initiative and actions that would require prior approval of the World Bank.

#### OTHER ACTIVITIES IN THE PROJECT AREA

103. All seven of the communes that constitute the core RLDP area are considered by the government to be difficult and remote. They are therefore included in a number of other programs targeting poverty reduction. They are listed in Table A10.3.

**Table A10.3: Development Programs in Core RLDP Area**

<b>Program Name</b>	<b>Main Activities</b>
135 program	Rural transport
60 poor district program	
Poverty alleviation and hunger eradication	Loans of VND 5-7 million per household from social banks Cattle promoted by 3 districts through this program
134 program	New houses for poor ethnic minority communities
139 program	Healthcare for the poor
Stabilization of lives of H'mong people in Muong Lat (Thanh Hoa Ethnic Minorities' Committee)	290 Billion VND (18 Million USD); activities not yet known
Agricultural extension	Subsidized hybrid maize seed

Program Name	Main Activities
Cattle development (district governments and farmer association)	Credit for cattle raising
Microcredit (Women's Union with support from World Vision and Craftlink)	Microcredit for women, hand-woven cloth
Fruit tree extension (Muong Lat)	Small-scale trials of fruit seedlings
Luong bamboo development project – 2005-2010.	Sustainable development of Luong bamboo production and markets. Farmer groups, decentralized primary processing workshops in the lower Ma valley, village nurseries.
Northern mountains poverty reduction project phases I and II (World Bank)	Tan Xuan: comprehensive poverty reduction
HIV/AIDS (World Bank)	Active in Muong Lat
661 program	Community grants for protection forest management (VND 50,000/Ha, closed program)

104. These projects are not considered linked within the definition provided by OP 4.12, since they are not directly related to the Trung Son Hydropower Project, nor necessary for it to achieve its objectives. With good coordination, several of the projects can be expected to reinforce the expected outcomes of the proposed project.

#### Western Thanh Hoa Road

105. A particular case in point of a concurrent but not linked project is the Western Thanh Hoa road. It is part of a plan to improve the road network in the region. It runs for 190km broadly north-south along the western edge of Thanh Hoa, starting in the north in Quan Hoa district then passing through Muong Lat, re-entering Quan Hoa, and on to Quan Son, Lang Chanh and Thuong Xuan districts. A section of the road passes through the project area and will connect with the access road for the project. Feeder roads include one running along the left bank of the Ma River from Muong Lat town as far as Chieng Nua where it joins the main road. Construction of the bridges is already under way and contractors have built a number of temporary roads supporting construction of the bridges, so that they can move plant and materials up to the bridge sites. In most cases this temporary work follows the same alignment as the intended road. In some areas it does not, and in particular there is one stretch of 5 km in the vicinity of the dam construction site that runs south along the original track from Ta Ban before turning west, still following the track which runs along the side of the Ma River.

106. The EIA for the road construction has been completed and follows Vietnamese regulations; road construction is required to be covered by an Environmental Commitment. Households have been resettled from the road alignment and compensated according to Vietnamese laws. Some have been relocated into Ta Ban village whence they will have to be moved once more when the reservoir fills. Before appraisal, the Bank determined that construction of this road was not considered a “linked” for the purposes of Bank policy, since it is not necessary to meet the project objectives, and it is not directly and significantly related to the Bank project. Hence TSHPCo has no formal or legal obligations related to the resettlement of these 28 households.

107. Notwithstanding the absence of any formal or legal obligations, the particular circumstances these households may face maintaining livelihoods and living standards before they are to be displaced again warrants monitoring and possibly supplemental assistance to be provided by TSHPCo on an exceptional case-by-case basis if needed. TSHPCo has studied impacts on all 28 households that were caused by the road displacement, whether those affected had been fully compensated in accordance with provincial procedures and standards, and the extent to which the households have succeeded in re-establishing livelihoods. The initial assessment found that most people who are affected have lost their houses and to a much lesser extent land. Twenty-three of the 28 households would be considered to be severely affected by the standards of the RLDP because they have suffered complete loss of their houses. A further three households have lost 50 percent or more of their residential land. Twelve of the 28 households would be considered vulnerable by the standard of the RLDP.

108. These households will be included in the pilot phase of CLIP implementation, which would accelerate their eligibility for RLDP assistance. They will be fully eligible for all forms of assistance based on their circumstances before initial displacement. For example, if those who lost a house during the road construction were temporarily living with relatives, they would remain eligible for housing-related assistance when they are resettled again.

## Annex 11: Consultation, Communications and Community Relations

### VIETNAM: VN-Trung Son Hydropower Project

#### PUBLIC CONSULTATION

##### Consultation Purpose

1. Public consultation is a key component of the TSHPP. The objectives of consultation are:

- Inform the affected households and communities, local authorities and civil society organizations about potential project impacts and proposed mitigation measures.
- Collect opinions/feedback to enable the preparation of resettlement plans and frameworks, and, in the later stages to complete the RLDP and EIA/EMP; and
- Obtain broad support for the project.

##### Approach to Consultation

2. Consultation has been central to preparation of the project. Table A11.1 sets out the main consultation activities undertaken during project preparation.

**Table A11.1: Main Consultation Activities**

Date	Location/Participants	Purpose
2008 (January and April)	5 access road affected communes, 12 villages	Preparation of access road RP
2008 (March)	5 reservoir affected communes, 10 villages Systematic household sample (1 out of 7) and focus group discussions, 3 workshops (102 farmers), leaders, local institutions, local NGOs	Preparation of CLIP (analysis of livelihood challenges and opportunities)
2008 (April-June)	5 reservoir affected communes in core RLDP area and 1 road affected commune, 11 villages, 440 people of which 190 from relocated households, leaders and health sector staff	Health impact assessment
2008 (May-August)	6 reservoir affected communes, 499 persons in meetings, 30 in-depth interviews, 57 district and commune officials 3 access road affected communes	Social assessment
2008 (July)	14 villages in main project area affected by relocation	Resettlement sites
2008 (October)	All related villages	Second round of consultation for CLIP, replacement cost study, host communities
2008 -2009 (December - January)	34 villages affected by access road, construction sites, reservoir, upstream and downstream impacts	Environmental impacts and social impacts. Land loss not involving relocation.
2010 (January-March)	RLDP consultation: - Community, commune and district level - National civil society consultation	Consultation on RLDP and EMP, project design

### ***Consultation with Affected and Potentially Affected Communities***

3. Consultation with affected communities has evolved over time. Initial consultations were designed to provide information to affected communities, and to elicit information from them. This stage tended to be of a top-down nature aligned with the suggestions of the commune people's committees and village heads, during which project staff provided factual information. Information from those affected by the project tended to be gathered in quantitative measures. The latter stages of consultation, particularly the second and third rounds of consultation in late 2008 and early 2009 and again in late 2009 and early 2010 have aimed at presenting the plans based on the earlier consultation with the intention of building consensus, as well as responding to concerns voiced by those affected by the project.

4. The third round of consultation, on which the finalized versions of the EMP and RLDP are based is of particular note. Consultation was conducted in 56 affected villages or communities and took place in three steps:

- Before the consultation. During December 2009 and January 2010 and at least three weeks before the consultation meeting, information of appropriate form and in local languages was provided at district, commune, village and household level. The information varied depending on the level at which it was supplied. Full versions of the EMP and RLDP were made available at the district and commune level. A summarized and simplified version of about 20 pages was provided to the commune people's committee and village head. Information sheets, posters and calendars which included some project information, frequently asked questions and contact details were given to village heads and distributed to all households. Audio recordings of the project information, frequently asked questions and contact information, with a machine on which they could be played were provided at village level. Recordings were in four languages: Vietnamese, Thai, Muong and H'Mong.
- At the consultation. Consultation meetings were carried out during January and February 2010 in each affected village with participation of as many villagers as possible and any other interested individual/organizations. Extra efforts were taken to encourage women and others who might otherwise be excluded to attend; consideration was given to having separate meetings with any group that was reluctant to attend the village meetings. A short oral summary of the project, its impacts and proposed mitigation measures was presented in the meeting. All questions/ feedback and requests were properly recorded and provided appropriate responses. Group discussions were held if needed. In addition to Vietnamese, translation of the discussions into local languages was provided as necessary. Photographs and video recording were taken but only if they did not inhibit the consultation process. Minutes were prepared for each consultation and agreed to with participants. A summary report to describe the consultation process and main findings was prepared no later than one week after completion of the consultation. At least one observer from a Vietnamese NGO was present at each of the village consultations.
- After the consultation. All questions were collated and summarized, and responses provided. Where appropriate, changes were introduced into the EMP and RLDP. The questions, responses and revised versions of the EMP and RLDP were provided to all affected villages. A summary of the concerns expressed during the consultations is in Table A11.2 and how they have been integrated into the EMP, PHAP and RLDP.

**Table A11.2: Main Findings From Consultation**

<b>Impact</b>	<b>EMP, PHAP</b>	<b>RLDP</b>
<b>Dam</b>	Schedules, speed limits, worker code of conduct	
Noise, dust, road safety	Maintenance of water flow	
Downstream impact	Communities relations and safety plan	
Safety during flooding	Workers code of conduct	Ethnic Minorities
<b>Construction worker camp</b>	Awareness training of workers and managers on local cultures	Development plan
Social impact	Communication channel for communities with TSHPMB and contractor	Communication
	Incidents and grievance reporting and monitoring	
<b>Health</b>	Camp health management plan	Ethnic Minorities
Increased disease transmission rates from workers	Camp follower management plan	Development plan
Increased drug use and trade among workers	Awareness programs for workers and young villagers	Communication
Increased demand for local health services	Regional health plan	
Health among local people		
<b>Environment</b>	Natural resources and biodiversity management plan	
Loss of forest cover	Community forest management plan	
<b>Cultural Resources</b>	Chance finds procedure for graves, artifacts	Resettlement plan
Loss/alteration of cultural sites		Ethnic Minorities
		Development plan
		Communication
<b>Social</b>		Resettlement Plan
Resettlement of affected households/communities		
Livelihoods affected		Community Livelihoods Improvement Plan
		Ethnic Minorities
Loss of ethnic/cultural identities		Development Plan
Cumulative effects from other projects	Cumulative Impact Assessment as part of EMP	
Increased impacts from lack of consultation	Public consultation	Ethnic Minorities
		Development plan: consultation and participation framework

### ***Consultation with Civil Society***

5. Both formal and informal links have been developed with civil society, in particular with: Vietnamese mass organizations such as the Women's Union and Farmers' Union, many of which are present in project affected areas; Vietnamese and international NGOs, both those concerned with advocacy and those working on programs in or close to the project area; academia; and private citizens. TSHPCo has developed an active dialogue with the Vietnamese NGOs which monitor and report on conditions in the project area.

6. Formal consultation with civil society organizations took place in March 2010, managed by the World Bank in collaboration with the TSHPMB and chaired by an independent facilitator. The draft RLDP and EIA/EMP disclosed at the project affected area was provided to all



participants. Presentations were made by TSHPCo on the project and on the results of the consultations. A representative of the NGOs which had attended the village consultations reported on its findings. Participants included representatives of mass organizations, Vietnamese and international NGOs, academics, concerned government institutes and journalists.

### ***Consultation with Local Government***

7. At the district level, consultation was carried out in Muong Lat and Quan Hoa districts of Thanh Hoa Province, Mai Chau District of Hoa Binh Province and Moc Chau District of Son La Province. Participants were from relevant district/communes authorities, at least one representative from each affected village in the respective district and representatives from provincial authorities as appropriate. At provincial level, consultation has been implemented in the three provinces of Thanh Hoa, Son La and Hoa Binh with participation of relevant departments such as the provincial electricity department, Ethnic Minority Department, Agricultural and Rural Development Department, Natural Resources and Environmental Department, and Department of Labor, Invalids and Social Affairs. These consultations have covered all aspects of the project, including the frameworks for the transmission lines.

### **Consultation Results**

8. The following were general comments from project-affected households: (i) welcome and support the construction of TSHPP; (ii) believe that quality of life should improve with additional community services and infrastructure; (iii) concerns of local people on compensation rates for land areas required and agricultural production and bamboo affected by the project; (iv) state policies should financially assist impacted villages, especially after construction and resettlement; (v) environmental policies minimize the extent of environmental pollution; (vi) implementation of mitigation measures specified in EMP and programs in RLDP; and (vii) village security and environment shall be sustained.

9. Agricultural land and its productivity are the main concerns of local villagers. Resettlement land and its productivity need to be of equal or greater value to the lost land. Bamboo takes approximately six to seven years before it can be harvested; therefore, adequate financial or “land-for-land” compensation will be vital in supporting villages during and, more importantly, after construction. Resettled and affected areas will also receive financial support and health, education and community services and programs.

10. Village security and maintenance of social order were also common concerns. The rapid population increase, particularly the number of males in the Co Me and Chieng Po communes, could dramatically increase the amount of gambling, prostitution, theft, drugs and disease. Several villages requested State guards during construction.

### ***Outcomes***

11. During project preparation, consultations have been pivotal in:

- Finalizing the report on Supplementary Environmental and Social Impact Assessment (SESIA) and Environmental Management Plan (EMP).
- Creating the RLDP with three main components: the RP, CLIP and, EMDP and its communication and management component as one integrated whole.

- Initiating an open dialogue between TSHPMB authorities, village leaders and affected households. The goal was to ease the transition into resettlement areas, while improving living conditions and quality of life of affected households.

12. One of the most significant outcomes of consultation with communities during preparation has been the revision, in two out of four communes, of the resettlement sites that had been initially planned. New, smaller sites have been selected with more fertile soils and higher water resources. Through consultation, all H'mong communities have expressed a preference for relocation within their village which can be accommodated through a "back and up" process. All the resettlement sites are currently planned for a mainly Thai/Muong population, with a few Kinh households. Consultation with local social organizations has led, among other elements, to inclusion of prevention of HIV/AIDS and women and child trafficking in impact mitigation measures.

#### Free, Prior and Informed Consultation Has Led to Broad Community Support

13. The principle of free, prior and informed consultation in ethnic minority villages has been pursued during project design and will be continued during implementation. In practice this has meant provision of written, visual and audio materials in form, substance and language appropriate for the audiences well in advance of consultations. The consultations have been held at hamlet or village level, and led by respected members of the community. Minority or under-represented groups, including women and young people have had opportunities to express their opinions in all meetings. Communities will continue to have opportunities to voice concerns.

14. Reports of consultations provided by consultants indicate support for the project. This is supported by firsthand experience of the task team and Bank management through several field visits throughout the project area since 2008. In the most recent field visit, in October 2010, several communities expressed continuing support for the project, and requested acceleration of project implementation. In the opinion of the task team, there is broad community support for the project.

#### COMMUNICATIONS

15. Given its large and diverse group of stakeholders, TSHPP requires an extensive communication effort taking place on multiple levels to ensure ownership and understanding are maintained. The purpose of the communications effort is to strengthen support for the project by demonstrating that development does not have to be at a cost that is unacceptable to project affected people or the environment.

#### Target Groups

16. The two main target groups and objectives for the communications with them are as follow.

##### ***Project Affected People***

17. The objective is to maintain and further build support through knowledge and understanding of the project based on free and prior informed consultation. Continuous consultations and information sharing with those directly and indirectly affected by the project are essential through the life of the project. They are the only permanent constituency affected by the project and their satisfaction is central to its success. Developing communication channels

and strategies to build a consensus to support the project's social, environmental and livelihood goals are key to ensuring that they participate and receive their share of the benefits of the project.

### ***Other Stakeholders***

18. The objective is to increase transparency and engagement at all levels - particularly around safeguards and disclosure aspects - and maintain open channels of communication. Stakeholders in this category include: Vietnamese CSOs; International service delivery NGOs working in Vietnam; ambassadors, donors and other partners in Vietnam's development; the hydropower industry; academics; media in Vietnam as represented by local and international correspondents; advocacy NGOs; and World Bank internal audiences.

19. TSHPCo's engagement directly with national NGOs has made a good beginning and will be built upon. A key expected outcome from this approach will be for EVN to improve its information sharing and engagement practices within this project thus demonstrating the importance for sustained communications with all stakeholders in all hydro projects.

### **Key Principles in Communications Approach**

20. The communications strategy is based on the following principles:

- Primacy of EVN in communications. The lead for communications matters lies with EVN and TSHPCo. Bank support to develop capacity in this respect has been provided during preparation and will be financed during implementation. Coordination of messages, speakers and activities by EVN and the World Bank is required. Communications on matters of Bank policy will be handled by the Bank.
- Accessibility. Information generated by the project must be accessible to all stakeholders to the extent possible, through media that are suitable for the audience as to both content and language. Communications with local stakeholders must be in both Vietnam's official language and ethnic minority languages. The use of local languages provides a solid platform for project ownership by those who will benefit and also be affected. Recognizing that there is international interest, some communications must be in English.
- Two way communications. Requests made by the public for information and the responses to them, as well as information provided by the EVN or the Bank and the public reaction to it are of equal value.
- Candor. The project is likely to have unanticipated impacts – recognized in the adaptive management design adopted – and communicating those impacts candidly as well as seeking constructive dialog with impacted stakeholders is key to building trust and defining sustainable solutions.
- Proactivity. Project information will be communicated proactively and not simply in response to requests for information.

### **Document Disclosure**

21. All environment and social safeguards resettlement instruments have been disclosed at the project site in Vietnamese, in the Vietnam Development Information Center (VDIC) in Vietnamese and English and the Public Information Center (Infoshop) of World Bank located in Washington, DC in English, at least three weeks in advance of consultations. They have been updated as new information has become available.

22. In keeping with the principles of transparency and engagement with civil society that EVN and the World Bank have adopted for the project, it has been agreed that a broader range of documents used for preparation of the safeguards instruments and for other aspects of the project will be disclosed. In addition, the Strategic Environment Assessment of the Hydropower Master Plan, the Master Plan for the Ma River and the Environment Impact Assessment for the Trung Son Hydropower Project approved by MoNRE in 2008 have also been disclosed. Consistent with the disclosures already made, these documents are available through TSHPCo's web site, Vietnam Development Information Centre in Hanoi, the Infoshop and the Bank's dedicated web site for the Trung Son Project.

23. The list of documents on the project file, is in Annex 14, all which have been disclosed.

#### COMMUNITY RELATIONS AND GRIEVANCE RESOLUTION

24. Outreach, information sharing and communication with the project affected population is vital given the impacts and importance of hydropower for the growth of the Vietnamese economy. Ensuring the project affected population has proper and opportune understanding of the project impacts and a space to express their concerns and inquiries during the implementation of the project are critical for the success of the social component implementation of the Trung Son hydropower project. Participation by local communities plays a crucial role in information dissemination, implementation and monitoring of livelihood activities, implementation of public health and safety measures, environmental protection, and mediation and conflict resolution acts, to name a few.

25. The extended consultation, outreach and information sharing activities performed during the early stages of the project – identification and preparation – needs to continue, and even more, be mainstreamed throughout all the implementation stages of the project's main impacted areas: resettlement, reservoir and downstream, access road and transmission lines. It will now be the turn of TSHPCo to take the responsibility for executing such activities under the community relations function, which is integrated into the day to day management of the safeguards team, and also an obligation on the main civil works contractor.

#### Community Relations Objectives and Responsibilities

26. The community relations function is for all people affected by the project whether previously identified as such, or whether incidentally or subsequently affected. Its responsibilities are to:

- Address in a timely way concerns and complaints from the people and communities affected by the project.
- Ensure communities are promptly and adequately informed ahead of impacts and actions programmed as part of project implementation.
- Offer a vehicle for mutual interaction between TSHPMB and those affected by the project to receive inputs from individuals and the local communities.
- Act as the forum for discussion and consultation about project impacts that arise during implementation and which have not been anticipated.

#### The Community Relations Function

27. TSHPMB has established a community relations function tasked with achieving the objectives outlined above. It is this function which has taken the lead in disclosing and

distributing information to people affected by the project. During project implementation the main duties of the community relations function will be to:

- Inform the population about construction and work schedules, interruption of services, traffic detour routes and provisional bus routes, blasting and demolition and other consequences of construction. Adequate notification of schedules and interruptions will be provided; in most cases at least five days' notice. The community relations function will ensure that it provides advice through the most suitable means, such as postings at the project site, at bus stops, and in affected homes and businesses.
- Ensure that construction activities occur during daylight hours. If night work becomes necessary, local communities shall be properly informed so they can take necessary measures.
- Maintain open communications between local governments and communities, including a mailing list to include agencies, organization, and residents that are interested in the project. A key part of this function is to respond to telephone inquiries and written correspondence in a timely and accurate manner.
- Monitor community concerns and information requirements as the project progresses and respond to changes in community needs as necessary to be adequate during different project implementation phases.
- Act as a repository of project information, especially information that has been publicly disclosed, so that it is freely available to people affected by the project.
- Provide the first point of contact – and an effective means of resolving – complaints, grievances, disputes or concerns from people, communities or groups that are affected by the project. In the event that it cannot resolve these matters, the function is responsible for ensuring access to other entities which are able to resolve them, which are discussed in the section on grievance procedures.

28. The community relations function will ensure that it provides all information, especially technical findings, in a language that is understandable to the people affected by the project and who need the information. It will operate from an office at the project site, with at least some presence outside the area secured as the construction site, to ensure accessibility

29. TSHPMB will appoint a Community Relations Officer (CRO) who forms part of the safeguards team.. In addition the main civil works contractor will be required to provide a community relations liaison person. Additional staff from the TSHPMB and the main civil works contractor will work with the CRO as required.

#### Grievance Procedure

30. Complaints and Grievances are distinguished in Vietnam as separate issues. Complaints relate to dissatisfaction about matters that are likely to include:

- The process – time taken; complexity; lack of information.
- The service provided – poor service; inadequate or incorrect advice; fees charged; demands for informal payments; damage to property.
- Quality (completeness and accuracy) of the record.
- Health and security.

31. Grievances relate to issues that cannot be solved immediately and may not be solved locally. In resettlement, the scope of the grievance procedure includes all land issues directly

related to project impact including, if appropriate, clarification of boundaries between villages and communes. For ethnic minorities affected by the project, these issues may relate to (a) conflict between communities on access and management of natural resources, (b) any other matter for grievance in relation to ethnic minority cultures.

32. TSHPCo monitors complaints in order to improve quality of the resettlement process, and to ensure project compliance with the EMDP for ethnic minority issues. Complaints and grievances will be handled in a similar way and may be reported through two channels. First, a legal mediation channel formed by Peoples' committees from commune up to province level, is in place in Vietnam. This channel is distinct from the technical project implementation formed by the District Compensation Committee and commune workgroup. Second, the project itself sets up an alternative channel, the Independent Grievance Mechanism.

### ***Formal grievance process***

33. The formal national procedure of the Land law is based on four stages of mediation:

- First step: if any person is aggrieved by any aspect of the resettlement and rehabilitation program, he/she can lodge an oral or written grievance with commune authorities. The Commune People's Committee will resolve the issue within fifteen days from the date it receives the complaint.
- Second step: if any aggrieved person is not satisfied with the decision in the first step, he/she can bring the complaint to the District People's Committee (DPC) within fifteen days from the date of the receipt of the first step decision. The DPC will reach a decision on the complaint within fifteen days.
- Third step: if the aggrieved person is still not satisfied with the decision at district level, he/she can appeal to the Provincial People's Committee within 45 days of receiving the decision of the DPC. The Provincial People's Committee will reach a decision on the complaint within the timing regulated by Vietnamese law.
- Fourth step: if the DP is not satisfied with the decision of the Provincial level, the case may be submitted for consideration by the District Court within 45 days of receiving the decision of the PPC. The District Court will reach a decision on the complaint within the timing regulated by Vietnamese law.

34. Grievances are received orally (in the Vietnamese language or a local ethnic language) or in written form. Assistance provided by the TSHPMB social team will include (a) recording all grievance files and report them in the monthly monitoring process and follow up to ensure timely resolution, and (b) exempting persons registered as residents in project affected communities from administrative or legal fees associated with pursuit of grievances. Grievance resolution will take place within a set maximum number of days in accordance with regulations.

35. During the mediation process, TSHPMB managers ensure that grievance redress committees meet in a timely manner to resolve mediation at the second and third steps above. They ensure that those seeking grievance redress are actually given the choice to accept mediation or to seek redress at a higher level. The formal grievance mechanism suffers from a risk, real or perceived, that the same group of people who cause the grievance – the People's committees at various levels – also hold responsibility for putting them right. This weakness leads to the need for a system that is perceived to be more fair.

### ***Independent Grievance Panel***

36. TSHPMB has established the Independent Grievance Panel (IGP), a grievance mechanism independent of the system established under Vietnamese law. The safeguard team in TSHPMB will provide a monthly monitoring report to the panel to allow it to monitor all complaints and grievances.

37. Complaints or grievances are received through a variety of sources, including, for example direct from either the individual or a group, or through a representative, such as the village head, a representative of a mass organization or an NGO in the Vietnamese language or a local ethnic language or in written form. They may also be reported through the Commune People's Committee, which informs the safeguard team; or directly to the safeguard team during monthly compliance monitoring. The complainant may be assisted by others throughout the process. Key principles in the informal process are: (a) to deal with the matter at the lowest possible level; and (b) to address complaints as quickly as practicable to avoid minor issues becoming major ones.

38. The complainant's first point of contact with TSHPCo is the project Community Relations Officer (CRO), a member of the Social and Environment Department. The CRO will take up the matter with relevant members of the Department to try to reach a solution. If no solution satisfactory to the complainant can be achieved, the complainant meets the Manager of the Social and Environment Department, who addresses the issue in conjunction with heads of other departments in TSHPCo, contractors and, as necessary, local authorities. Records of meetings between complainants will be maintained and reviewed by the project IMCs. Meetings are conducted in a language acceptable to the complainant and in a setting appropriate to the needs of the meeting (which may include the site of the complaint, or the offices of TSHPCo).

39. If the complainant is not satisfied with the solutions on offer from the head of the Trung Son Safeguards Team, the IGP will hear the case. The IGP is composed of the head of the Trung Son Safeguards Team, and at least one member of the independent Environment and Social Panel of Experts (PoE). It is chaired by the Director of TSHPCo. It may co-opt additional members as required including, for example, independent social and environment monitoring consultants, a technical expert or an NGO. It may also take independent advice from consultants or other experts at its discretion.

40. Complaints received by the IGP will be publicly disclosed when they are received. The IGP will hear the complaint in a face-to-face meeting, at which the complainant and any advisor or representative may be present. The IGP will publish its findings promptly after it has completed its deliberations and one member of the IGP will be delegated to communicate the findings to the complainant in a suitable form and language.

41. The IGP will convene quarterly to review all complaints dealt with by either the CRO or the head of the Trung Son Safeguards team, and to discuss any ongoing complaints. The IGP can be convened by any individual member to deal with urgent matters which cannot wait until the next scheduled meeting.

42. Project information leaflets provide practical information about grievances to local residents such as contacts and addresses. They mention both the legal mechanism and the IGP, and provide information about how to get in touch with both.

## Annex 12: Governance and Accountability

### VIETNAM: VN-Trung Son Hydropower Project

#### PURPOSE

1. The purpose of the Governance and Accountability Framework (GAF) is to identify fraud and corruption risks in the Trung Son Hydropower Project (TSHPP) and to put in place specific mitigations to address them. The risks of procurement or implementation failures in the project are significant and could have serious implications for the safety of the dam, the welfare of people affected by the project and the TSHPP's economic, financial and technical performance. Such failures could have impacts extending well beyond the project, potentially even to the broader hydropower investment strategy. While procurement capacity and financial management assessments have concluded that the project risks are high and substantial respectively, this GAF focuses on strengthening of governance within Trung Son Hydropower Company (TSHPCo) to prevent and detect specific fraud and corruption events.

#### PRINCIPAL SOURCES OF RISK AND MITIGATIONS ALREADY IN PLACE

2. The principal areas of concern extend from detailed design through preparation of bidding packages, bid evaluation and award, construction supervision and invoice payment. Since the World Bank's Procurement and Consultant Selection Guidelines will be used for much of the procurement, it is possible to forecast the methods of procurement against the type of item to be procured and the value of them. Over 93 percent of Works procurement will be done according to World Bank international competitive bidding (ICB) procedures using ICB standard bidding documents (SBDs). Another three percent will be done using national competitive bidding (NCB) or shopping and will use GoV procurement procedures with the applicable bidding documents being reviewed in advance by the World Bank. The remaining four percent will be done according to GoV procurement rules. For Goods procurement, ICB accounts for 97 percent of the procurement and most of the equipment is sourced from firms outside Vietnam. Vietnamese procedures are followed for less than two percent of Goods. For Consultants the situation is quite different with 54 percent of total services being procured through GoV procedures. Notwithstanding the high percentages of procurement under WB rules, given that the construction sector in Vietnam has been identified as a sector particularly prone to corruption, the primary focus of this GAF is on civil works procurement. The high percentage of consulting services following GOV procedures makes consultant procurement an important secondary focus.

**Table A12.1: Procurement Method and Items To Be Procured**

	Aggregate value of procurement in US\$ million by method			
	ICB	NCB/Shopping	QCBS/QBS/ CQS/IC	Vietnamese methods
Goods	118.7	0.4		3.2
Works	172.2	6.21		6.4
Services			19.0	22.1

3. Disbursement arrangements for resettlement allowances were also briefly examined, as these are often a major locus of corruption in hydro projects too. However, in this project, they appear to be quite robust with good policy disclosure, final disbursement done by a commercial bank, and strong local community oversight as well as other independent monitoring and evaluation.



4. While the use of Bank Guidelines and Standard Bidding Documents reduces the corruption risks in procurement where Bank financing is used, it does not eliminate them all. Significant risks remain in bid evaluation and in the use of local subcontractors within international bids. Use of Vietnamese procedures has the potential to add additional risk due to a number of gaps compared with World Bank procedures. These have been analyzed by the Bank's procurement specialists and include: shorter pre-qualification and bid preparation times; less rigorous bid documentation requirements; retroactive extension of bid deadlines; increased opportunities to reject bids on non-substantive grounds; the possibility of using a merit point system for evaluation of bids for works; inadequate distinction between qualification and evaluation criteria; use of an estimated price which when exceeded can result in re-pricing of bids; routinely waiving the binding nature of bids by negotiation of goods and works procurement; and weaker restrictions on direct contracting and sole sourcing. While use of these variations on best procurement practice may be less prevalent in EVN than in general public procurement in Vietnam, TSHPCo staff must live with two parallel procurement systems and their reconciliation is not always easy. TSHPCo has also confirmed in workshops that several of these gaps are indeed sources for concern that require mitigation.

5. In construction supervision, less is known about the detailed risk areas. Indications from a basic value chain analysis conducted through interviews of TSHPCo staff suggest that collusion with contractors does occur particularly on quantity assessments related to progress payments. The scale of these is not however clear. Facilitation payments driven by delays in approvals and payments are also common. TSHPCo has already put in place single points of contact with contractors so that accountability for quantity and quality approvals is clear. They have also set fixed payment times. However, the primary mitigant is the use of supervising consultants acting as owner's engineers, and involved in the complete project implementation cycle from detailed design to contractor invoice approval. TSHPCo is well aware of the critical importance of selecting highly reputable supervising consultants with a proven track record of integrity and commitment to quality supervision. TSHPCo has also suggested a need to increase its own direct supervision as an additional layer of assurance, and they have requested the Bank's assistance with specialist training in avoiding construction supervision failure and in identification and provision of specialist test equipment to support better supervision.

#### EXISTING CAPACITY AND EFFECTIVENESS

6. EVN has a long history of successful project implementation with the World Bank. Its capacity for procurement is well established. Much of this procurement has been in transmission and the successor entity NPT has inherited this procurement capacity. Distribution is similarly well endowed. This is reflected in the record of procurement complaints. From a total of over 1,300 contracts subject to the Bank's prior review that have been procured in energy projects since October 2005 when records began, the Bank has received 27 procurement complaints. Of these complaints, 14 were either dropped by the complainant or found not to be substantiated, the Bank validated three complaints with which the Borrower agreed, three complaints were settled between the Borrower and complainant, two were subject to cancelation of the bids and rebidding and two cases are still pending.

7. Two of the complaints about procurement relate to the proposed project. In one, both the Bank and EVN received allegations of collusion between members of TSHPMB and certain bidders during the bidding for the access roads and bridges in September 2009. In response EVN cancelled the bidding process, rebid the contracts and reassigned four named members of

TSHPMB's management to positions outside TSHPMB. The allegations were also referred to the national authorities and the Bank's Integrity Vice Presidency. The prompt action by EVN senior management in this matter both signaled its intention to take seriously allegations of corruption and avoided any financial loss to fraud. The second complaint is still pending and does not involve an allegation of fraud or corruption.

#### Trung Son Hydropower Project Management Board

8. In TSHPP, almost all procurement (except a significant transmission component which is to be implemented by NPT) will be managed by TSHPCo. TSHPCo is recognized by both EVN and the World Bank as a young entity with limited procurement experience and capacity. For this reason, all procurement activities are currently expected to be prior reviewed by EVN Procurement Department. TSHPCo staff have been given training in World Bank procurement procedures. The same requirement for approval by EVN also applies to construction supervision. While the need for multiple levels of approval is understandable at the outset of the project, they do not necessarily increase the level of assurance. Over the course of the project, the Bank would expect to see more approvals repatriated into TSHPCo, consistent with bringing accountability down to specific individuals which is a principle that TSHPCo leadership is already clearly espousing.

#### The Inspection Function (including Complaints and Denunciations)

9. While some proactive measures to prevent fraud and corruption across the project cycle are already in place, and specific weaknesses can be mitigated as recommended below, particular weaknesses exist in the Inspection process which is supposed to help prevent corruption, and in the complaints and denunciations process which should help detect corruption after it has occurred. Inspection activities tend to be compliance checks against legal, regulatory and internal policy requirements. They do not appear proactive enough at identifying and correcting process weaknesses. Although line managers are expected to take steps to prevent corruption in the first place, the Inspection Department does not take a strong preventative stance, and there is a disconnect between prevention and detection with the result that there are few incentives to develop recommendations for specific preventative improvements to procedures.

10. Complaints and denunciations activities are intended to respond to complaints received about the conduct of the procurement process, or allegations (petitions) against specific individuals or entities (including both EVN and contractors bidding on EVN work) of misconduct of all sorts. The complaints and denunciations process is subject to overlapping and conflicting laws and regulations, whose inherent contradictions result in a significant number of complaints not being investigated at all. The majority of complaints are received anonymously or under false names raising doubts about the level of protection afforded to whistleblowers. While the Anti-Corruption Law, 2005 states that "all corrupt acts must be detected, stopped and handled" and one of its implementing Decrees (120-2006-ND-CP) specifically provides management with the discretion to investigate anonymous complaints, other laws and decrees limit complainants to individuals and entities directly involved in the specific bid who are willing to sign their names on a complaint or allegation. The activities of subcontractors also cannot be investigated. For these reasons, many complaints and denunciations that could be legitimate go uninvestigated.

11. New legislation that may address these conflicts is still with the National Assembly but it remains unclear whether this will proactively strengthen the grounds for investigation of

anonymous complaints, or merely provide complainants and denunciators with additional protection. Implementation of any new legislation will also depend on the issuance of regulations (decrees and circulars) and EVN internal decisions and these may significantly lag the Law. Despite the current conflicts, systems for anonymous complaints and denunciations can and should be put in place, and TSHPCo is committed to doing so.

12. TSHPCo has defined Inspection responsibilities that stem from the EVN Charter, but it currently has limited capacity to implement these. Inspection is one of several responsibilities assigned to the Administration Department. Recognizing this weakness, TSHPCo has hired a dedicated full-time individual reporting directly to the TSHPCo Director to establish and maintain all necessary anti-corruption systems both within the defined Inspection and Complaints and Denunciation processes, and as further identified and agreed below.

#### MITIGATING FRAUD AND CORRUPTION IN TRUNG SON HYDROPOWER PROJECT

13. Two factors provide the way forward for mitigating corruption and fraud in the project. First is that there is a strong legal basis for, and government commitment to, preventing and combating corruption although it must be recognized (as noted above) that there are impediments slowing implementation. The second is that both top EVN management and TSHPMB leadership are willing and able to champion practical and innovative initiatives that can be implemented within existing regulations, policies and procedures provided these can be managed to be compliant with the law.

#### Legislative Framework

14. The Anti-Corruption Law, 2005 is recognized as one of the strongest and most wide-ranging in thematic scope in Asia, but this naturally makes its implementation challenging. The law emphasizes proactive, systemic approaches not just punitive, reactive ones. Noteworthy provisions include: broad and specific definition of corrupt acts; the need to handle corruption with public scrutiny; the need for agencies to be proactive in precluding and detecting corrupt acts and to review periodically their own performance; the need for detailed reporting of procurement outcomes; civil servants' codes of conduct that are made public; asset declaration for senior management; personal liability of senior management for corrupt acts occurring under their jurisdiction; the need to take the initiative in organizing inspection including regular and random inspections as well as complaint resolution; rights and obligations of any citizen to denounce corrupt acts; and the responsibility of agencies to create favorable conditions for citizens to make denunciations.

15. The National Strategy for Preventing and Combating Corruption Towards 2020 emphasizes the need to be proactive, to strengthen the independence and self-responsibility of Inspectorates, and to continue to improve mechanisms for protecting and praising whistle-blowers. Vietnam also participated in a 1 year pilot under the UK's Department for International Development/ World Bank funded Construction Sector Transparency Initiative (CoST). This pilot consulted with a broad range of stakeholders in construction – including government, contractors, professional associations, and civil society – to agree on what and how more detailed procurement and construction supervision process information can be publicly disclosed in Vietnam. The draft final report of the Vietnam pilot is has not been released but it is known that it provides a precedent for more detailed public disclosure of procurement activities within TSHPMB – particularly the reasons for bid failure – and for more public disclosure of construction progress (both actual to plan time and cost) and for tracking of change orders and

subcontractors. The Trung Son project is an opportunity to build further on the CoST pilot successes in increasing disclosure.

16. In short, workable legislative frameworks are in place and TSHPMB has the authority to work within them. There may be specific lower level legal and regulatory obstacles because of the overlap and contradictions already highlighted, but it should be possible to appeal where necessary to the higher Anti-Corruption Law directly. Institutional resistance in some areas is likely to be a higher barrier to initiative.

#### Measures to Improve Anti-Corruption Environment in TSHPMB

17. EVN has already demonstrated its commitment to anti-corruption in the way it has requested support to review its governance and accountability framework, in part as a result of the allegations of collusion in early procurement activities for access roads and bridges under this Project. It further demonstrated its commitment by swiftly and effectively handling the allegations, canceling the bidding and reassigning managers from TSHPMB. TSHPCo on its own initiative now requires all bidders submitting bids proposed to be financed by the Bank to certify that they have read and will abide by the requirements of the World Bank's 2006 Guidelines on Preventing and Combating Fraud and Corruption in Projects Financed by IBRD Loans and IDA Credits and Grants. Copies of these Guidelines are included in the bidding documents in English and Vietnamese. The current leadership of TSHPCo has clearly indicated to the Bank its willingness to work proactively to put in place further practical and targeted "bottom-up" anti-corruption measures, rather than wait for top-down approaches that are less specific and are slow to come. Already some improvements in internal controls such as tighter control over bidding document security, single points of contact with contractors and fixed payment times have been made.

18. Risk areas for action, identified during the review of the governance and accountability arrangements for EVN and TSHPCo are:

- (a) Enhancing integrity by raising awareness;
- (b) Strengthening of accountability for package integrity;
- (c) Strengthening of project controls to increase accountability;
- (d) Enhancing transparency in project procurement and implementation;
- (e) Improving capture of complaints to increase accountability.
- (f) Broadening stakeholder involvement to increase accountability.

19. Mitigating actions for these risk areas where TSHPCo can further improve its integrity, transparency and accountability include: training and capacity building; introducing a Project Code of Ethics and Conflict of Interest Register; introducing a system of "bid package captains"; tightening internal controls in targeted risk areas; increasing disclosure of procurement, construction supervision, and inspection activities in terms of disposition and outcomes; making confidential access by whistleblowers easier; improving complaints and denunciations procedures; and potentially broadening the involvement of other stakeholders in procurement and implementation activities through the use of Integrity Pacts. Specific initiatives under these headings are described in Table A12.2 and they have been assigned a priority for their implementation; with some high priority actions already having been initiated.

**Table A12.2 Action Plan for the Governance and Accountability Framework**

<b>Risk Reduction Area:</b> A. Enhancing Integrity by Raising Awareness <b>Priority:</b> High		
1. Provide Anti-Corruption, Procurement, Construction Supervision and “Red Flags” Training for all TSHPCo staff	Training should focus on recognizing opportunities for corrupt acts, personal responsibility and liability, the damage caused by corruption, and how to act when confronted with corruption. The Bank's "red flags" for different stages in the project lifecycle should be included in the training. All training for all staff will be completed by loan effectiveness.	Apr 11 – full set of custom training materials developed and translated. Bank procurement and “red flags” training delivered.  Jun 11 – all other training delivered (in Vietnamese),
2. Implement a Project Code of Ethics	A Code of Ethics is a staff handbook that is linked to the Anti-Corruption training and refers to the applicable Law. All TSHPCo staff would be required to sign it. It should be possible to build on the 2009 proposal of MPI to prepare a Bidding Code and the Anticorruption Guidelines.	Apr 11 – Code drafted  Jun 11 – Code fully implemented across TSHPCo
<b>Risk Reduction Area:</b> B. Strengthening of Accountability for Package Integrity <b>Priority:</b> Medium		
1. Appoint a specific individual manager (a "bid package captain") who takes responsibility for the integrity of a specific package across the full contract lifecycle.	TSHPCo is currently organized in a series of functional departments (e.g. Technical, Economic and Planning). There are multiple handoffs between departments both within TSHPCo and up and down with EVN. Integrity of a bid package cuts across functions and appointment of a "bid-package captain" to provide this cross-functional perspective would increase accountability. It would also bring the Anti-Corruption training and Project Code of Ethics to life as well as provide another development opportunity for junior staff. Package value would guide the allocation of individuals by seniority.	Apr 11 – “bid package captains” trained and appointed
2. Use consultants to support supervision	Good consultants, knowledgeable about the risks in procurement and contract management, and how to mitigate them can support the “bid package captain”.	Ongoing once “bid package captains” in place

<b>Risk Reduction Area: C. Strengthening of Project Controls to Increase Accountability</b> <b>Priority: Medium</b>		
1. Address specific internal controls weaknesses in procurement and construction supervision.	<p>TSHPCo to develop internal compliance checklists that apply checks against the Bank's "red flags" to the project life cycle. Include in the checklist any specific use of GoV procurement procedures that have been flagged by the Bank as "gaps". Coverage would include: checking of bidders against debarment lists maintained by MPI, deviations from open competitive bidding, robustness of specifications and proper definition of inspection and testing procedures, controls on release of bid documents and information, pre-qualification practices, formation of bid evaluation committees, bid evaluation and reporting procedures, controls on contact with bidders, independent involvement in testing and progress checking during construction, use of random checks and site visits, limits on change orders, claims approvals processes, and contractor evaluation. TSHPCo is already actively using the Bank's "red flags" framework to identify and mitigate the largest process weaknesses in its current procurement and construction supervision processes.</p>	Apr 11 – checklists and controls in place
2. Maintain an active Conflict of Interest Register	<p>A project-specific Conflict of Interest register would be maintained within TSHPCo with new bidders and their subcontractors added as necessary as new packages are issued. Individuals involved in each bid package would perform a positive check against the register and declare any conflicts.</p>	Mar 11 – Conflict of Interest Register in place

<p>3. Improve the complaints and denunciations resolution process</p>	<p>An individual specifically responsible for the complaints and denunciations resolution role within TSHPCo has been hired. He will immediately establish the systems and reporting for complaints receipt and resolution to assure that all complaints whatever their source, and whether anonymous or not, are actioned effectively to ensure that all available hard evidence is gathered, whether this is brought forward by the complainant or is available in the normal course of bidding.</p> <p>This individual will also act as the Bank's direct counterpart for technical assistance funds to be allocated for capacity building of TSHPCo to introduce and sustain all the recommendations within this action plan.</p>	<p>Feb 11 – basic “as-is” EVN manual process in place</p> <p>Mar 11 – extend manual process to anonymous complaints</p>
<p><b>Risk Reduction Area:</b> D. Enhancing Transparency in Project Procurement and Implementation <b>Priority:</b> High</p>		
<p>1. Increase public disclosure of procurement disposition and outcomes, and of construction supervision.</p>	<p>The foundation for more disclosure of procurement activities exists but effective reporting is not yet occurring. Minimum requirements are included (Forms 5-11) in the Bank's Quarterly IFR reporting process following the Aligned Monitoring Tool. However, reporting should extend further to include prequalification and bidding process and results, more detail on evaluation and award outcomes, and complaints disclosure (all while reflecting confidentiality provisions). The CoST pilot has already demonstrated the feasibility and value of additional disclosure in procurement and construction supervision, and it provides a good foundation on which to build even more disclosure. A simple portal on the TSHPMB web-site will be developed for this disclosure.</p>	<p>Mar 11 – increased disclosure standards in place</p>

2. Increase public disclosure of complaints sources, disposition and outcomes	Again while there is some intent, effective reporting of complaints even internally to the Government entities is not yet occurring. The ongoing analysis of complaints received and processed by EVN Inspection department will inform this reporting and it would be facilitated again by a web portal linked directly to the complaints receipt system described below in D1.	Mar 11 – increased disclosure standards in place
<b>Risk Reduction Area:</b> E. Improving Capture of Complaints to Increase Accountability <b>Priority:</b> High		
1. Provide a secure portal for complaints that encrypts the identity of whistleblowers to facilitate anonymous two-way communication with them	TSHPCo will voluntarily expand confidential access to make complaints to all citizens through the use of a simple encrypted portal. This would not only increase the confidence of individuals and parties to make complaints, but it would also facilitate secure two way communication to quickly eliminate the "noise" of baseless complaints. As in D2. above, sources (with suitable protection to maintain confidentiality), disposition and outcomes of all complaints received would be automatically logged and tracked and publicly disclosed directly from this system.	Feb 11 – user requirements and development approach agreed  Apr 11 – system development completed  Jun 11 – system fully implemented



<b>Risk Reduction Area: F. Broadening Stakeholder Involvement to Increase Accountability</b> <b>Priority: Low</b>		
1. Use Anti-corruption Guidelines as the basis for introducing Integrity Pacts	<p>Integrity Pacts (developed by Transparency International) have been successfully applied in a number of hydropower projects around the world. They cover similar ground to the World Bank Guidelines on Preventing and Combating Fraud and Corruption (the Anti-corruption Guidelines) but have the advantage of being in plainer language, requiring all parties in the bid process to sign, and requiring more specific disclosure and commitment requirements from bidders (e.g. the disclosure of all payments made in connection with the contract – including to agents and middlemen). Unlike the Bank's Guidelines, Integrity Pacts also provide a basis for continuing dialogue with stakeholders to develop tighter anti-corruption procedures. The introduction of Integrity Pacts (particularly as these are normally combined with third party monitoring in F2. below) is however expected to be challenging in Vietnam and for this reason is given a low priority for now.</p>	Review and determine timelines once all other measures in place
2. Explore extending role of third parties in monitoring impact of Anti-corruption Guidelines	<p>A further extension of the use of the Anti-corruption Guidelines by extending oversight of procurement to include independent third party monitoring and evaluation. There will be challenges in identifying agencies with the necessary competence, capacity and willingness to perform this role in Vietnam at this time, but the CoST initiative has helped to identify some potential candidates.</p>	Review and determine timelines once all other measures in place

20. Subject to TSHPMB committing to these initiatives and to regular assessment and reporting of progress with them as part of World Bank project supervision, the overall governance risk is assessed to be high, but moderate after mitigation.

**Annex 13: Project Preparation and Supervision**  
**VIETNAM: VN-Trung Son Hydropower Project**

**Table A13.1: Key Project Milestones**

	Planned	Actual/Completed
PCN review	01/19/2007	12/19/2006
Initial PID to PIC		10/02/2009
Initial ISDS to PIC		08/02/2010
Appraisal	12/06/2010	12/16/2010
Negotiations	03/14/2011	03/17/2011
Board/RVP approval	04/26/2011	
Planned date of effectiveness	09/15/2011	
Planned date of mid-term review	09/15/2014	
Planned closing date	12/31/2017	

Key institutions responsible for preparation of the project:

Vietnam: Ministry of Industry and Trade; Provincial People's Committees of Hoa Binh, Son La and Thanh Hoa Provinces, and affected District and Commune People's Committees in those provinces; Vietnam Electricity, including Trung Son Hydropower Project Management Board; National Power Transmission Corporation and Power Engineering Consulting Joint Stock Company No. 4

World Bank: IBRD and donors/trust fund financiers from Australia, Japan (PHRD) and Norway

**Table A13.2: Bank Staff and Consultants Who Worked on the Project**

Name	Title	Unit
<i>Bank Staff</i>		
Hisham Abdo Kahin	Senior Counsel	LEGES
Beatriz Arizu	Senior Energy Specialist	EASIN
Mai Thi Hong Bo	Partnership Officer	EACVF
Daniel R. Gibson	Lead Social Development Specialist	ECSEQ
Douglas J. Graham	Senior Environment Specialist	EASVS
Dung Anh Hoang	Transport Specialist	EASVS
Van Thi Thanh Khuc	Consultant	EASVS
Dung Kim Le	Team Assistant	EACVF
Jeffrey Lecksell	Cartographer	GSDPG
Joel Maweni	Lead Energy Specialist	EASIN
Maria Cristina Mejia	Communications Officer	EXTEU
John Morton	Senior Urban Environment Specialist	LCSUW
Hoi-Chan Nguyen	Senior Counsel	LEGES
Lan Thi Thu Nguyen	Social Specialist	EASVS
Lien Thi Bich Nguyen	Program Assistant	EACVF
Toan Hong Nguyen	Environment Specialist	EASVS
Thao Le Nguyen	Senior Financial Manager	CTRFC
Trang Van Nguyen	Economist	EASPR
Alessandro Palmieri	Lead Dam Specialist	OPCQC

Name	Title	Unit
Anh Nguyet Pham	Senior Energy Specialist	EASVS
Juan D. Quintero	Environment Specialist	SASDE
Perry Lee Radford	Program Assistant	EASIN
Richard Spencer	Task Team Leader	SASDE
Jie Tang	Co-Task Team Leader	EASTS
Ky Hong Tran	Energy Specialist	EASVS
Mai Thi Phuong Tran	Financial Management Specialist	EAPFM
Phuong Thi Thanh Tran	Senior Environment Specialist	EASVS
Kien Trung Tran	Senior Procurement Specialist	EAPPR
Hung Tan Tran	Procurement Specialist	EASVS
Hung Tien Van	Senior Energy Specialist	EASVS
Son Thanh Vo	Social Specialist	EASVS
Ly Thi Dieu Vu	Environment Specialist	EASVS
Chaohua Zhang	Senior Social Specialist	SASDS
<i>Consultants</i>		
Mara T. Baranson	Project Management Specialist	
Yen Thu Cao	Environment Specialist	
Prabha Chandran	Communications Specialist	
Ian Driscall	Governance Specialist	
Mar Miralles Gasparini	Communications Specialist	
Dan O' Hearn	Financial Analyst	
Charles Hutton	Hydropower Engineer	
Lars Lund	Social Scientist	
Peter Meier	Economist	
Victoria Minoian	Communications Specialist	
Lars O. Oedegaard	Hydropower Engineer	
Loc Thanh Pham	Governance Specialist	
Robert P. Taylor	Former TTL	
Soren Theilgaard	Agricultural Economist	
<i>Peer Reviewers</i>		
Amarquaye Armar	Lead Energy Specialist	ETWES
Luc Lecuit	Senior Operations Officer	EACTF
Oeyvind Lier	Senior Energy Specialist	TWIWA
Rohit Mittal	Financial Analyst	SASDE
William Rex	Lead Social Development Specialist	EASTS
Vladislav Vucetic	Lead Energy Specialist	MNSEG

Bank funds expended to date on project preparation:

1. Bank resources:	\$953,715
2. Trust funds (Bank Executed):	\$84,040
3. Total:	\$835,627

Estimated Approval and Supervision costs:

1. Remaining costs to approval:	\$15,000
2. Estimated annual supervision cost:	\$175,000 - \$200,000

**Annex 14: Document Disclosure**  
**VIETNAM: VN-Trung Son Hydropower Project**

<b>Document</b>	<b>Disclosed</b>
<b>A. Related to Identification Phase</b>	
Project Information Document in English and Vietnamese	April 14, 2009
Environment Impact Assessment Report at Investment Project Phase (May 2008)	May 11, 2010
Master Plan for Use and Protection of Water Resources of the Ma River in Vietnamese	November 16, 2010
Strategic Environment Assessment of the Hydropower Master Plan in the Context of the Power Development Plan VI, Main Report and Appendices (January 2009)	November 16, 2010
Environment Impacts Assessment for Trung Son Hydropower Project as Approved by MoNRE in English and Vietnamese (June 2009)	November 16, 2010
<b>B. Related to Preparation Phase</b>	
Updated Project Information Document	February 10, 2009
Integrated Safeguards Data Sheet (Preparation Stage)	July 31, 2010
Resettlement Livelihood Development Plan & Annexes (Draft)	December 23, 2009
Resettlement Policy Framework – Power Line Component	May 19, 2010
Environmental Management Plan draft report	December 23, 2009
Supplemental Environmental Impacts Assessment (SESIA, Draft)	December 23, 2009
Draft Resettlement Plan for Access Road and Bridges	September 15, 2009
Summary of Planning on Environment Management for Access Road and Bridges	November 16, 2010
Environmental Impacts Assessment (EIA) and Annexes for Access Road and Bridges	February 17, 2009
Environmental Management Plan (EMP) for Access Road and Bridges	December 23, 2009
<b>C. Documents supporting preparation of SESIA</b>	
Reservoir Vegetation Cover Clearance Plan (December 4, 2009)	November 16, 2010
Impact Assessment Of Trung Son Hydropower Project To Fish-Biodiversity And Fisheries - Mitigation Measures Suggest (December 2008)	November 16, 2010
Assessment Of Impacts Caused By Trung Son Hydropower Project To Protected Areas And Terrestrial Biodiversity (2008)	November 16, 2010
Trung Son Reservoir Hydrodynamic And Water Quality Modeling (May 4, 2009)	November 16, 2010
Operation Model Of Reservoir - Technical Design (July 2010)	November 16, 2010
Environmental Guidelines For Power Lines (May 18, 2010)	May 19, 2010
Planning On Environment Management Access Road And Bridges Trung Son Dam By IESE (2008)	November 16, 2010
Report Of Construction And Camp Management Of Trung Son Hydropower Project (March 23, 2010]	November 16, 2010
Health Impact Assessment And Public Health Action Plan (July 10, 2010)	November 16, 2010

<b>D. Livelihoods</b> Research report of livelihoods opportunities and challenges of the communities living in region affected by hydroelectricity power dam Trung Son - Thanh Hoa by Research team of GRET (March 31, 2008) Social and economic survey and assessment report by DRCC. (June 20, 2008)	November 16, 2010  November 16, 2010
<b>E. Physical Cultural Resources</b> Investigating Tangible Cultural Resources In The Area Of Trung Son Hydro-Electric Project, Thanh Hoa Province (November 2008)	November 16, 2010
<b>F. Economic and Financial Analysis of Project and Alternatives</b> Alternatives To The Trung Son Hydro Project (December 2009) Trung Son Hydro Project Economic Analysis Final Report (January 2011) Trung Son Hydropower Project Financial Analysis Final Report (February 2011)	November 16, 2010 March 7, 2011 March 7, 2011
<b>G. Independent Assessments - Panel of Experts and Independent Monitoring</b> Panel of Experts Report #1 (August 2008) Panel of Experts Report #2 (June 2010) Inception report on Independent Resettlement Monitoring for the Road (September 2009) Independent Resettlement Monitoring for the Road Mission I report (August 2009) Independent Resettlement Monitoring for the Road Mission II report (July 2010) General Consultation Report/ English version General Consultation Report / Vietnamese version Response to Comments during Consultations/ Vietnamese version Response to Comments during Consultations / English Version	November 16, 2010 November 16, 2010 November 16, 2010 November 16, 2010 November 16, 2010 January 26, 2011 January 26, 2011 April 1, 2011 January 26, 2011
<b>H. Related to Appraisal</b> Updated Project Information Document Appraisal Stage Updated Integrated Safeguards Data Sheet Appraisal Stage Supplementary Environment and Social Impact Assessment report (SESIA) Environmental Management Plan (EMP) Executive Summary of Environmental Impacts Assessment Resettlement, Livelihood and Ethnic Minorities Development Program (RLDP)	January 20, 2011 January 26, 2011 January 28, 2011 January 28, 2011 January 28, 2011 January 28, 2011

**Annex 15: Statement of Loans and Credits**  
**VIETNAM: VN-Trung Son Hydropower Project**

			OriginalAmount in USS Millions						Fm.
	FY	Purpose	IBRD	IDA	Grant	Cancel.	Undisb.	Orig.	Rev.
P085071	2006	Customs Modernization		65.90			69.51	56.74	
P088759	2009	Fin Sector Modern and Info Mgmt System		60.00			57.62	0.38	
P116353	2011	Higher Education DP Program 2nd Operation		50.00			50.83		
P082627	2005	Payment System and Bank Modernization 2		105.00			37.92	37.83	37.83
P075399	2003	Public Financial Management Reform Proj.		68.33			40.57	18.84	
P099376	2008	Tax Administration Modernization Project		80.00			79.85	51.78	
P065898	2004	VIETNAM WATER RESOURCES ASSISTANCE		157.80			47.53	38.58	
P108885	2009	VN - Agriculture Competitiveness Project		59.80			51.23	16.96	
P066051	2005	VN - Forest Sector Development Project		39.50			16.02	13.12	
P074414	2005	VN - GEF Forest Sector Development Proj			9.00		4.79	4.79	4.79
P083593	2006	VN - National CFC & Halon Phaseout Pr			1.26		0.75	-0.35	
P079344	2006	VN -ICT Development		93.72		5.98	73.72	70.41	25.39
P073361	2006	VN -Natural Disaster Risk Mngt Project		161.00			83.67	0.32	
P110693	2010	VN New Model University		180.40			187.69	6.00	
P079665	2007	VN-2ND HIGHER EDUCATION		59.40			26.93	19.11	
P113493	2010	VN-2nd Northern Mountains Poverty Redctn		150.00			142.27	-0.65	
P101608	2007	VN-Avian & Human Influenza Control &Prep		20.00			4.15	3.61	
P082295	2007	VN-COASTAL CITIES ENVMT SANIT.		124.70			96.43	15.90	
P095275	2010	VN-Central North Region Health Support		65.00			62.02		
P085393	2008	VN-GEF-Hanoi Urban Transpt Dev			9.80		8.71	5.06	
P090374	2009	VN-GEF-IF-Coastal Cities			5.35		4.10		
P099460	2009	VN-GEF-PCB Management Project			7.00		6.32	0.95	
P080074	2005	VN-GEF-RURAL ENERGY 2			5.25		3.94	-1.11	
P083581	2008	VN-HANOI URBAN TRANSPORT		155.21			144.29	79.40	
P052037	2001	VN-HCMC ENVMTL SANIT.		256.34			100.57	18.67	-45.62
P104848	2007	VN-HIFU DEVELOPMENT		50.00			34.02	27.63	
P082604	2005	VN-HIV/AIDS Prevention Project		35.00			2.19	2.11	
P096418	2008	VN-Land Administration Project		75.00			64.34	20.04	
P090723	2010	VN-Livestock Competitiveness & Food Safety		65.26			64.10	17.72	
P094055	2010	VN-Local Development Investment (LDIFP)		190.00			187.40	20.05	
P083588	2007	VN-MKG DELTA TRANSPORT INFRA DEV		207.70			176.71	47.55	10.02
P079663	2006	VN-Mekong Regional Health Support Proj		70.00			17.21	17.71	
P042927	2001	VN-Mkg Transp & Flood Protection		135.00			21.59	22.64	-1.41
P095129	2008	VN-Northern Delta Transport Dev		170.00			161.81	28.50	
P082672	2008	VN-Northern Upland Health Support Proje		60.00			50.25	-6.79	
P086508	2008	VN-Priority Infra Investment		152.44			134.20	9.71	
P118610	2010	VN-Project Preparation TA Facility		100.00			98.56		
P059663	2004	VN-ROAD NETWORK IMPROVEMT		225.26			83.72	66.52	
P085080	2005	VN-ROAD SAFETY		31.73			22.03	21.17	11.59
P077287	2006	VN-RRD RWSS		111.14			76.77	1.43	
P074688	2005	VN-RURAL ENERGY 2		420.00			229.56	0.23	

FY	Purpose	Original Amount in US\$ Millions				Undisb.	Orig.	Fm. Rev.
		IBRD	IDA	Grant	Cancel.			
P103238	2009	VN-Renewable Energy Development Project	202.00			208.01	30.25	
P099211	2008	VN-Rural Distribution Project					-	
			150.00			79.80	32.94	
P075407	2006	VN-Rural Transport 3	106.25			57.82	31.29	16.64
P066396	2002	VN-SYSTEM ENERGY, EQUITIZATION & RENEWAB	251.51			31.85	43.62	-43.62
P091747	2009	VN-School Education Quality Assurance	127.00			124.18	10.65	
P084871	2006	VN-TRANS & DISTRIB 2	200.00			82.45	68.83	
P100916	2008	VN-Third Rural Finance Project	200.00			111.51	32.32	
P070197	2004	VN-URBAN UPGRADING	382.47			286.68	47.25	
P073763	2005	VN-WATER SUPPLY DEV.	112.64			82.11	60.61	

VIETNAM  
STATEMENT OF IFC's  
Held and Disbursed Portfolio  
In Millions of US Dollars

FY	Company	Loan	Equity	Committed			Loan	Equity	Disbursed Outstanding		
				**Quasi	*GT/RM	Participant			**Quasi	*GT/RM	Participant
Approval				Equity					Equity		
2011	An binh bank	0	0	37.94	0	0	0	0	37.94	0	0
2009	Antara	7	1.21	0	0	7	7	1.21	0	0	7.00
2011	Cict	38.75	0	0	0	0	6.14	0	0	0	0
2002	Dragon capital	0	0	1.05	0	0	0	0	1.05	0	0
2005	Khai vy	2.25	0	0	0	0	2.25	0	0	0	0
2010	Masan group	0	0	36.57	0	0	0	0	36.4	0	0
2009	Nghi son cement	34.44	0	0	0	29.12	34.44	0	0	0	29.12
2010	Paul maitland	10	0	0	0	0	10	0	0	0	0
2009	Paynet	0	0	1.5	0	0	0	0	1.18	0	0
2010	Piaggio vietnam	20.75	0	0	0	0	0	0	0	0	0
2006	Sabco	21.25	0	0	0	0	21.25	0	0	0	0
2007	Sacombank	19.46	0	0	0	0	19.46	0	0	0	0
	Sn power sing	0	0	1	0	0	0	0	0	0	0
2008	Ssit	70	0	0	0	0	21.81	0	0	0	0
2008/10	Techcombank	35.5	0	0	0	0	35.5	0	0	0	0
2011	Thien minh group	0	0	12	0	0	0	0	12	0	0
2010	Tvs ibank	0	0	5	0	0	0	0	0	0	0
2004	Veil	0	15.45	0	0	0	0	15.45	0	0	0
2008	Vi fund i	0	6.93	0	0	0	0	6.3	0	0	0
2011	Vietinbank	0	55.61	0	0	0	0	0	0	0	0
<b>Total Portfolio:</b>		<b>259.4</b>	<b>79.2</b>	<b>95.06</b>	<b>0</b>	<b>36.12</b>	<b>157.85</b>	<b>22.96</b>	<b>88.57</b>	<b>0</b>	<b>36.12</b>

\* Denotes Guarantee and Risk Management Products

\*\* Quasi Equity includes both loan and equity types.

## Annex 16: Country at a Glance

### VIETNAM: VN-Trung Son Hydropower Project

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## Vietnam at a glance

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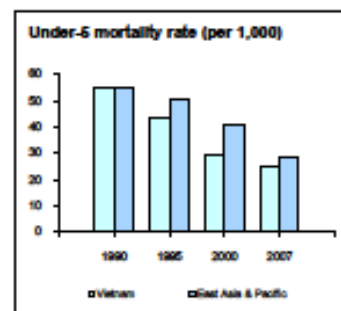
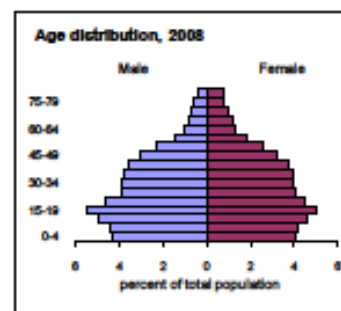
### Key Development Indicators

(2009)

	Vietnam	East Asia & Pacific	Lower middle income
Population, mid-year (millions)	87.3	1,930	3,767
Surface area (thousand sq. km)	331	16,299	31,923
Population growth (%)	1.2	0.7	1.2
Urban population (% of total population)	28	44	40
GNI (Atlas method, US\$ billions)	87.7	5,283	7,709
GNI per capita (Atlas method, US\$)	1,000	2,738	2,046
GNI per capita (PPP, International \$)	2,850	5,596	4,481
GDP growth (%)	5.3	8.5	7.5
GDP per capita growth (%)	4.0	7.7	6.3

(most recent estimate, 2003–2009)

Poverty headcount ratio at \$1.25 a day (PPP, %)	21	17	..
Poverty headcount ratio at \$2.00 a day (PPP, %)	48	39	..
Life expectancy at birth (years)	74	72	68
Infant mortality (per 1,000 live births)	20	22	44
Child malnutrition (% of children under 5)	20	12	25
Adult literacy, male (% of ages 15 and older)	95	96	87
Adult literacy, female (% of ages 15 and older)	90	90	73
Gross primary enrollment, male (% of age group)	..	111	109
Gross primary enrollment, female (% of age group)	..	112	105
Access to an improved water source (% of population)	94	88	86
Access to improved sanitation facilities (% of population)	75	59	50

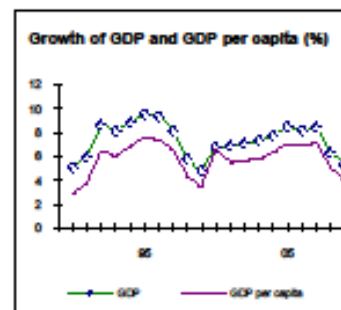


### Net Aid Flows

	1980	1990	2000	2008 *
(US\$ millions)				
Net ODA and official aid	277	181	1,581	2,552
Top 3 donors (in 2008):				
Japan	4	1	924	619
France	15	12	53	166
United Kingdom	3	0	8	126
Aid (% of GNI)	..	3.0	5.5	2.9
Aid per capita (US\$)	5	3	22	30

### Long-Term Economic Trends

Consumer prices (annual % change)	..	36.4	-1.7	6.5
GDP implicit deflator (annual % change)	..	42.1	3.4	6.0
Exchange rate (annual average, local per US\$)	0.6	6,482.8	14,167.8	17,065.1
Terms of trade index (2000 = 100)	..	..	100	105



Population, mid-year (millions)	53.7	66.2	77.6	87.3
GDP (US\$ millions)	..	6,472	31,173	97,180
			(% of GDP)	
Agriculture	..	38.7	24.5	20.9
Industry	..	22.7	36.7	40.2
Manufacturing	..	12.3	18.6	20.1
Services	..	38.6	38.7	38.8
Household final consumption expenditure	..	84.3	66.4	65.9
General gov't final consumption expenditure	..	12.3	6.4	6.3
Gross capital formation	..	12.6	29.6	38.1
Exports of goods and services	..	36.0	55.0	68.3
Imports of goods and services	..	45.3	57.5	78.7
Gross savings	..	-2.3	30.5	29.3

1980–90 1990–2000 2000–08  
(average annual growth %)

2.1	1.6	1.3
4.6	7.9	7.6
2.8	4.3	3.8
4.4	11.9	9.6
1.9	11.2	11.3
7.1	7.5	7.5
..	6.1	7.9
..	3.2	7.7
..	19.8	12.3
..	19.2	11.4
..	19.5	13.6

Note: Figures in *italics* are for years other than those specified. 2009 data are preliminary. .. indicates data are not available.  
a. Aid data are for 2008.

Development Economics, Development Data Group (DECDG).



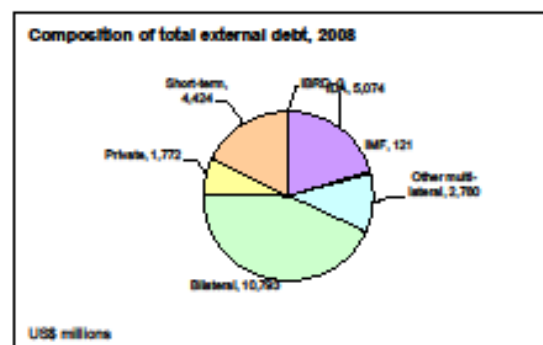
Balance of Payments and Trade	2000	2008
(US\$ millions)		
Total merchandise exports (fob)	14,483	57,096
Total merchandise imports (cif)	15,637	69,949
Net trade in goods and services	-173	-9,437
Current account balance	1,108	-7,437
as a % of GDP	3.6	-7.7
Workers' remittances and compensation of employees (receipts)	2,000	6,840
Reserves, including gold	3,030	14,148

#### Central Government Finance

(% of GDP)		
Current revenue (including grants)	20.4	24.5
Tax revenue	..	..
Current expenditure	15.9	20.9
Overall surplus/deficit	-2.0	-8.9
Highest marginal tax rate (%)		
Individual	..	35
Corporate	33	25

#### External Debt and Resource Flows

(US\$ millions)		
Total debt outstanding and disbursed	12,823	28,674
Total debt service	1,309	1,139
Debt relief (HIPC, MDRI)	..	..
Total debt (% of GDP)	41.1	29.5
Total debt service (% of exports)	7.5	1.8
Foreign direct investment (net inflows)	1,298	9,679
Portfolio equity (net inflows)	0	-678



Private Sector Development	2000	2008
Time required to start a business (days)	..	50
Cost to start a business (% of GNI per capita)	..	13.3
Time required to register property (days)	..	57
Ranked as a major constraint to business	2000	2008
(% of managers surveyed who agreed)		
Access to cost of financing	..	40.6
Access to land	..	26.9
Stock market capitalization (% of GDP)	..	21.8
Bank capital to asset ratio (%)	..	..

#### Governance Indicators, 2000 and 2008



Source: Kaufmann-Kraay-Mastruzzi, World Bank

Technology and Infrastructure	2000	2008
Paved roads (% of total)	25.1	47.8
Fixed line and mobile phone subscribers (per 100 people)	4	116
High technology exports (% of manufactured exports)	11.0	8.9

#### Environment

Agricultural land (% of land area)	28	32
Forest area (% of land area)	37.7	43.3
Terrestrial protected areas (% of surface area)	..	5.6
Freshwater resources per capita (cu. meters)	4,697	4,251
Freshwater withdrawal (billion cubic meters)	71.4	..
CO2 emissions per capita (mt)	0.69	1.3
GDP per unit of energy use (2005 PPP \$ per kg of oil equivalent)	3.3	3.7
Energy use per capita (kg of oil equivalent)	477	656

World Bank Group portfolio	2000	2008
(US\$ millions)		
IBRD		
Total debt outstanding and disbursed	..	..
Disbursements	..	..
Principal repayments	..	..
Interest payments	..	..
IDA		
Total debt outstanding and disbursed	1,113	6,270
Disbursements	174	1,206
Total debt service	9	87
IFC (fiscal year)		
Total disbursed and outstanding portfolio of which IFC own account	223	156
Disbursements for IFC own account	107	153
Portfolio sales, prepayments and repayments for IFC own account	25	24
MIGA		
Gross exposure	18	40
New guarantees	46	95
	10	0

Note: Figures in *italics* are for years other than those specified. 2009 data are preliminary.  
 .. Indicates data are not available. — Indicates observation is not applicable.

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Development Economics, Development Data Group (DECDG).

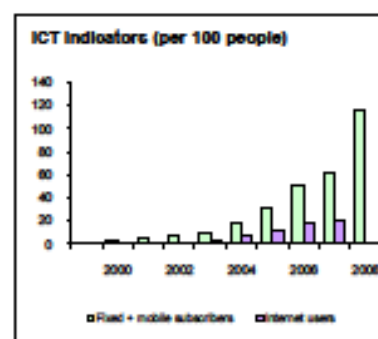
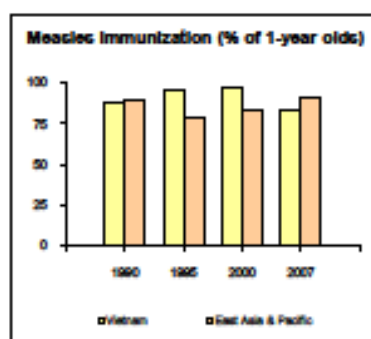
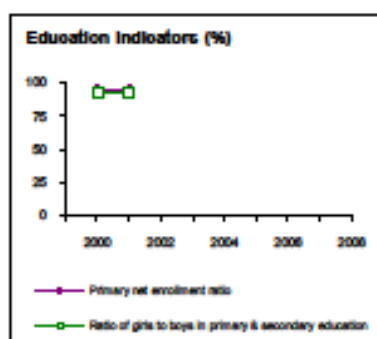
## Millennium Development Goals

Vietnam

With selected targets to achieve between 1990 and 2015

(estimate closest to date shown, +/- 2 years)

	Vietnam			
	1990	1995	2000	2008
<b>Goal 1: halve the rates for extreme poverty and malnutrition</b>				
Poverty headcount ratio at \$1.25 a day (PPP, % of population)	..	63.7	40.1	21.6
Poverty headcount ratio at national poverty line (% of population)	..	..	28.9	..
Share of income or consumption to the poorest quintile (%)	..	7.8	7.6	7.1
Prevalence of malnutrition (% of children under 5)	..	36.9	26.7	20.2
<b>Goal 2: ensure that children are able to complete primary schooling</b>				
Primary school enrollment (net, %)	..	..	95	..
Primary completion rate (% of relevant age group)	..	..	96	..
Secondary school enrollment (gross, %)	35	41	65	..
Youth literacy rate (% of people ages 15-24)	94	..	95	97
<b>Goal 3: eliminate gender disparity in education and empower women</b>				
Ratio of girls to boys in primary and secondary education (%)	..	..	93	..
Women employed in the nonagricultural sector (% of nonagricultural employment)	..	41	41	40
Proportion of seats held by women in national parliament (%)	18	19	26	26
<b>Goal 4: reduce under-5 mortality by two-thirds</b>				
Under-5 mortality rate (per 1,000)	55	44	29	24
Infant mortality rate (per 1,000 live births)	39	33	24	20
Measles immunization (proportion of one-year olds immunized, %)	88	95	97	92
<b>Goal 5: reduce maternal mortality by three-fourths</b>				
Maternal mortality ratio (modeled estimate, per 100,000 live births)	170	120	91	56
Births attended by skilled health staff (% of total)	..	77	68	88
Contraceptive prevalence (% of women ages 15-49)	63	66	74	78
<b>Goal 6: halt and begin to reverse the spread of HIV/AIDS and other major diseases</b>				
Prevalence of HIV (% of population ages 15-49)	0.1	0.1	0.3	0.6
Incidence of tuberculosis (per 100,000 people)	200	200	200	200
Tuberculosis case detection rate (% of all forms)	37	37	56	56
<b>Goal 7: halve the proportion of people without sustainable access to basic needs</b>				
Access to an improved water source (% of population)	58	68	79	94
Access to improved sanitation facilities (% of population)	35	47	57	75
Forest area (% of total land area)	28.8	32.4	37.7	43.3
Terrestrial protected areas (% of surface area)	..	..	..	5.6
CO2 emissions (metric tons per capita)	0.3	0.4	0.7	1.3
GDP per unit of energy use (constant 2005 PPP \$ per kg of oil equivalent)	2.5	2.9	3.3	3.7
<b>Goal 8: develop a global partnership for development</b>				
Telephone mainlines (per 100 people)	0.1	1.1	3.3	34.3
Mobile phone subscribers (per 100 people)	0.0	0.0	1.0	81.2
Internet users (per 100 people)	0.0	0.0	0.3	24.2
Personal computers (per 100 people)	0.0	0.1	0.8	9.6

Note: Figures in *italics* are for years other than those specified. .. Indicates data are not available.

3/24/11

Development Economics, Development Data Group (DECDG).

## **Annex 17: Maps**

### **VIETNAM: VN-Trung Son Hydropower Project**

VIETNAM  
TRUNG SON HYDROPOWER PROJECT  
Map 1: General Project Area



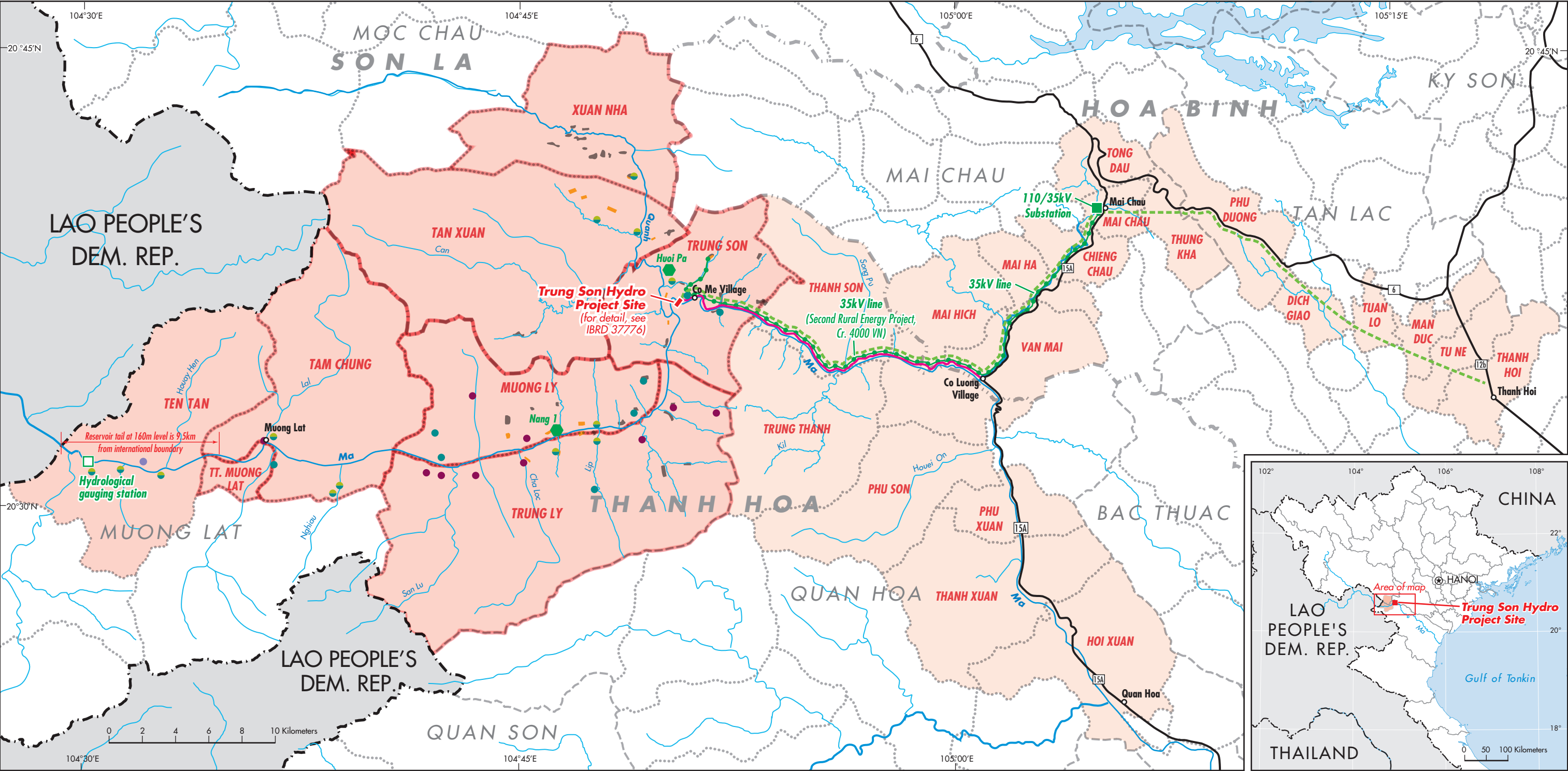
- PROJECT DAM SITE
- CORE RDP PROJECT AREA
- OTHER PROJECT AREA
- 35 kV LINES
- APPROXIMATE ROUTE OF 220 kV LINE;  
DETAILED ALIGNMENT TO BE DETERMINED LATER
- PROJECT ROAD
- MAIN ROADS

- VILLAGES WHICH WILL BE RESETTLED
- LANDS BEING PURCHASED FOR RESETTLED VILLAGES
- EXISTING VILLAGES AFFECTED BY RESETTLEMENT:
  - H'MONG
  - THAI
  - MUONG
  - KHO MU

- CULTURAL HERITAGE SITES
- COMMUNE BOUNDARIES
- DISTRICT BOUNDARIES
- PROVINCE BOUNDARIES
- INTERNATIONAL BOUNDARIES

- INSET:
- NATIONAL CAPITAL
  - PROVINCE BOUNDARIES
  - INTERNATIONAL BOUNDARIES

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VIETNAM  
TRUNG SON HYDROPOWER PROJECT  
Map 2: Area of Project Activities

- PROJECT DAM SITE
- CORE RDP PROJECT AREA
- FUTURE RESERVOIR (160 meter contour)
- DEAD LEVEL (150 meter contour)
- PROJECT ROAD
- TEMPORARY ROAD/USED ONLY DURING CONSTRUCTION PHASE OF THE PROJECT
- MAIN ROADS
- 35 kV TRANSMISSION LINES
- BORROW PITS
- NATURE AREAS
- COMMUNE BOUNDARIES
- DISTRICT BOUNDARIES
- PROVINCE BOUNDARIES
- INTERNATIONAL BOUNDARIES

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